REPORT

OF THE

PROCEEDINGS

OF THE

FOURTEENTH ANNUAL BLISTER RUST CONTROL CONFERENCE

HELD IN

Providence, Rhode Island, November 19-20, 1928.

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DETAILED PROGRAM

FOURTEENTH ANNUAL BLISTER RUST CONTROL CONFERENCE

NOVEMBER 19th & 20th, 1928

November 19th - Morning Session - Room 313, State House, Providence, R.I.

Dr. Walter H. Snell, Chairman.

Address of Welcome	Mr. H. A. Lewis, Comm.of Agri., State of Rhode Island.
Summary of 1928 Control Work	Mr. K.K. Stimson, Agent,Office of Blister Rust Control.
Use of Chemicals as Ribicides	Mr. William Clave,Agent, Mass.
The Eradication of Black Currants	Mr. C.E. Baker, Agent,New York.
The Psychology of Securing Cooperation From The Average Individual	Mr. A.B. Graham,Sr. Agr., Office of Cooperative Extension Work.

November 19th - Afternoon Session - Room 313, State House,Providence, R.I.

Mr. W.O. Filley, Chairman.

The Results of a School Survey to Determine Location of Ribes Infection in Michigan	Mr. D.J. Stouffer, State Leader, Michigan.
Planning and Arranging an Exhibit	Mr. G.E. Stevens, New York Conservation Department.
Suggestions on Educational Work	Mr. Roy G.Pierce, Assoc. Pathologist, Office Blister Rust Control.
Blister Rust Damage Studies	Dr. W.H. Snell, Forest Pathologist, Brown University.
Blister Rust Infection Conditions	Mr. W.C. Frost, State Leader, Maine. Mr. W.E. Bradder,Agent,Vermont.
Ribes Ecology	Mr. A.E. Vivaz, Agent, Office of Blister Rust Control.

Ribes Reseeding in Old-Field Types	Mr. E.W. Littlefield, Assistant Pathologist, N.Y. Conservation Department.
The Blister Rust Control Problem in the Eastern United States	Dr. J.F. Martin, Senior Pathologist, Office of Blister Rust Control.
Ribes Substitutes	Mr. George M.Darrow, Senior Pomologist, Office of Horticultural Crops and Diseases
The Western Control Program	Mr. G.B. Posey, Senior Pathologist, Office of Blister Rust Control.
Transit Inspection in Enforcement of Quarantines	Mr. R.A. Sheals, Agent, Bureau of Plant Quarantine and Control Administration.
Systematic Control Work	Mr. J.E.Riley, State Leader, Conn. Mr. T.J. King, Agent, N.H.
*Ribes Re-eradication	Mr. L.E. Newman, State Leader, N.H.
*Skunk Currant Eradication	Mr. S.D. Conner, Agent, Maine.

November 20th - Goddard Memorial Park, East Greenwich, R. I.

Mr. R. M. Ross, Chairman.

History of Goddard Memorial Park	Mr. T. G. Mathewson, Supt.
Original Poems on Goddard Memorial Park.	Mrs. T. G. Mathewson.
Epidemiology of White Pine Blister Rust 1928	Dr. L.H. Pennington, Pathologist, N.Y. State College, of Forestry.
The Willow Scab Disease (illustrated by slides)	Dr. G.P. Clinton, Botanist, Conn. Agri. Experiment Station, New Haven.

(*Read by title only)

The European Larch Canker ..... Dr. Perley Spaulding, Pathologist, Northeastern Forest Experiment Station, Amherst, Mass.

New Douglas Fir Disease ..... Dr. N.O. Howard, Pathologist, Laboratory of Office of Forest Pathology, Providence, R.I.
(illustrated by slides)

The Woodgate Rust ..... Dr. H. H. York, New York Conservation Department.

Field Trip to see Douglas Fir Disease, under direction of Dr. Howard.

Luncheon at Mansion House - served by Quidnessett Grange of East Greenwich.

White Pine Management ..... Mr. J. H. Foster, State Forester, N. H.

Report of Resolutions Committee ..... Mr. W. O. Filley, Chairman.

Inspection of forest plantations at Goddard Memorial Park - under direction of Supt. T. G. Mathewson.

ABSTRACT OF OPENING REMARKS BY HARRY R. LEWIS

COMMISSIONER OF AGRICULTURE FOR RHODE ISLAND

It gives me the greatest pleasure to welcome to the State of Rhode Island, this group of persons who have and are doing so much for the protection and the development of forestry here in the Northeastern States. We are especially pleased to have you come to Rhode Island for the reason that we have recently experienced and are experiencing a real awakening in forestry matters and are looking forward to the time at not a far distant date when Rhode Island will be playing a leading position in forestry development.

Rhode Island is a small State, being but thirty-five miles wide and forty-eight miles long, but within that limited area, there reside prosperous and happy, nearly three quarters of a million people. Hence, forestry in Rhode Island means more than just the growth of timber for commercial purposes. Its development is necessary to insure the protection of our water sheds and our reservoirs, to maintain an adequate water supply for this immense population.

The development of forestry is also essential to preserve natural timber growths in many sections of the State, to provide cover for wild animals; shade for our streams; and a wooded area which will enable our people to get away from the grind of city life and enjoy out-of-door recreation.

So, Rhode Island is taking a keener interest in forestry from many angles than it ever did before. This is evidenced by a recent revamping of our forest fire laws and the development of an efficient system of forest fire prevention and suppression. It is further evidenced by the reforestation activities which make it possible for the State to cooperate with land owners interested in developing forests through natural or artificial reforestation.

Right here I want to pay a distinct compliment to the blister rust eradication program which has been going on in Rhode Island for the past seven years and to say that I know of no line of work which the State has undertaken or accomplished in years past which has been more productive of real results. For as a result of the eradication program, the pine which we have in the State have been absolutely protected and blister rust has caused no commercial damage.

We are also delighted to have you with us in view of the fact that a portion of this session is going to be devoted to the inspection of our recently acquired forest reservation; namely, Goddard Memorial Park. This meeting here will add impetus and general public interest in our work, and we are anxious to be of every possible service in insuring the success of this session.

I understand that your program this year establishes a precedent, because it is the first time that a field trip has been included, and I feel that this precedent will warrant a continuation of this practice in the future.

It is further gratifying to note that the results of the past two annual conferences at Albany and Boston at which the blister rust agents were present for the first time, has been amply justified in enlarging the scope of these conferences, and I am delighted to welcome such a large number of agents here today because I know their presence will greatly increase the efficiency of their work.

Since blister rust was first found on pine in 1909, this is the fourteenth annual conference that has been held, and the seventh under the present control program. I believe the success of the blister-rust work has been partly due to these regular annual conferences at which time it has been possible to check up the work accomplished and lay out the next year's work. The progress made in blister rust control as indicated at your conferences during the last few years is of outstanding significance.

As a result of the present control program in the Eastern States from 1922 to 1928 inclusive, 5,800,482 acres have been cleared of 53,494,088 wild and cultivated Ribes at a cost of 17.7 cents per acre. The excellent public support of control work is evidenced by the fact that since 1922, 25,273 individuals have expended $ 300,781.82 in eradicating Ribes and 853 town appropriations have made available $ 264,776.31 for such work. Although 362,883 cultivated bushes have been destroyed, yet it has been necessary to compensate owners for only about 6 per cent of these bushes. It is also gratifying to note that all States are applying adequate measures to protect their State forests and plantations, and are also continuing on a more extensive scale, systematic nursery sanitation and eradication of cultivated black currants.

Today's program was arranged primarily for discussion of problems of especial interest to the blister rust control agents. All present are invited to take an active part in the discussions as only in this way can most benefit. As a result of this conference, we should be in a better position to develop plans for establishing control by completing the initial eradication work in the various States, and to adequately provide for maintaining control by applying re-eradication measures when and where necessary to insure the continued commercial growing of white pine as a profitable crop.

In conclusion, let me again, on behalf of the Department of Agriculture and on behalf of the State of Rhode Island welcome you to Providence and the State, and to assure you of our anxiety to cooperate in every way to make your program helpful and to make your stay in Rhode Island a pleasure.

TELEGRAM TO THE CONFERENCE FROM DETWILER

Tucson, Arizona, Nov. 16, 1928.

J. F. Martin,
Bureau of Plant Industry,
Washington, D. C.

I keenly regret inability to attend conference this year and gain inspiration for our great mutual task. During past twelve years we have achieved real success through sympathetic and loyal cooperation. I urge each one work with renewed vigor to assure perpetuation of white pine as major forest crop and thus advance practical forestry. Let keynote of conference be public service through cordial and effective cooperation. Conference might consider New Hampshire for next year's conference and visit Pratt's operations at Holderness.

S. B. Detwiler.

BLACK CURRANT ERADICATION - 1928.

By C. E. Baker.

Eradication of European black currant (Ribes nigrum L.) has perhaps been carried on more extensively in some states than in New York. It was not until the past season that much of a start was made in New York outside of the regular blister-rust control districts. The project of nursery sanitation begun in 1928 was the thing that really started such eradication. Previously in the sections outside of the regular blister-rust districts no eradication of any kind had been done and in the blister-rust districts the problem was one of getting out the wild Ribes. The removal of cultivated bushes played only a small part in the season's work, and after one season at the task of separating property owners from their Ribes nigrum, I am of the opinion that the most disagreeable phase of blister-rust work has just begun for the agent, especially if he is located in a district where natural pine stands are scarce and eradication is chiefly in plantations. In the Adirondack section of New York the people to a more or less extent realize the enormous value of the white pine growing naturally through most of that region, but in parts of New York where there was never much pine before the beginning of the State's program of reforesting, the people are not acquainted with pine values and have not the love for a white pine tree that they have for a row of black currant bushes, which have been supplying the family for years with various jams and jells made from the fruit.

A survey of all the nurseries in the State prior to the beginning of nursery sanitation work showed that there was a considerable number of them that were either growing or handling five-needled pines to a greater or less extent and to prevent infected nursery stock from spreading white-pine blister rust to sections where no blister rust was known to exist and to safeguard the numerous white-pine plantations being made, a thorough cleanup in the vicinity of all nurseries growing white pines was decided upon. The important nursery centers were picked out and a plan of work, which called for the eradication of all Ribes within 1500 ft. of the boundaries of the nurseries and eradication of all Ribes nigrum in the townships where the nurseries were located, was started. I will not touch upon the troubles that arose from the eradication within the 1500 ft. zone, except to say that in Newark, N. Y., where the first work was started in Wayne County, I spent about half of my time in conference with the chief of police, and the state troopers and in contradicting the various stories that were printed in the village papers. The work we did caused more talk in the village than anything since their last big murder.

The town of Arcadia, which was the first and only town in which Ribes nigrum was completely eradicated in the section where I worked is about 11 miles long and 7 miles wide. The time required to do the eradication work exclusive of the village of Newark was 10 two-man days. The

number of bushes removed was 395. The approximate cost of the removal of these bushes was $190 or about 50 cents per bush. Soon after the town of Arcadia was completed a change was made in the plan of work and no other town was completely eradicated of Ribes nigrum. Instead of cleaning up an entire town only the Ribes nigrum within a mile of nurseries growing five-needled pines were removed. I think, however, that the costs of a complete eradication in other towns would have run as high as the costs in the town of Arcadia. Using figures of costs for the town of Arcadia as a basis for estimate it seems that the probable cost of making a complete eradication of Ribes nigrum in Wayne County would have been between $4,000 and $4,500. Wayne County is composed of 15 towns. The costs for the entire State of New York would be so large that the present annual appropriation for blister-rust control would be used up each year for several years by just black-currant eradication. If such a project is ever started larger appropriations will be necessary.

The costs may seem excessive, but if the present growth of reforesting keeps on there must be eradication of Ribes nigrum if the plantations are to amount to anything. Everywhere in New York Ribes nigrum are present in sufficient numbers to start centers of infection. After the season in western New York was advanced far enough for infection to appear on the Ribes leaves not a single Ribes nigrum bush was found that was free from infection, and most of the bushes were heavily infected. Other cultivated Ribes were only very lightly infected if infected at all. The removal of Ribes nigrum, in that part of the State where pine occurs only as plantations and no pine infections have been found, would greatly reduce the chances of blister rust ever becoming a serious factor in those sections.

If all the various things that have been said to the writer in regard to the eradication of Ribes nigrum in the so-called agricultural sections of New York, were printed, a choice volume of spicy reading would be available. The names I have been called range from "a robber of the poor farmer," to much less complimentary ones. Once or twice when some person agreed with me and said that we should protect the pine of the country I could have fallen upon his neck.

In New York there is a State law, which declares Ribes nigrum to be a public nuisance and when a bush is removed no compensation is allowed. This lack of compensation for Ribes nigrum was one of the points that was especially irksome to most of the people who lost their bushes. A few cents per bush would have satisfied most of them, but when they got nothing for the destroyed bushes they advanced the argument that they did not see any reason why they should have to give up their bushes, because they were unlucky enough to be living in the vicinity of someone who wanted to grow pines for profit, or someone who wanted to establish a pine plantation. Without the State law there is no doubt but what many of the bushes removed would not have been removed. Some few were found who said that they did not want a pest on their property, but usually those people did not care for black currants and placed no value on the fruit.

The make-up of the population had much to do with the attitude of the people in Wayne County toward Ribes nigrum eradication. The population in this County is chiefly English, Dutch, and Italian. An Englishman would rather lose his fruit trees that are his livelihood than lose his black currants. To him they are not only food, but a cure-all for his ills. Without exaggeration I have heard black currants recommended for the following things: - Jams and jells; the branches steeped in water are said to be capable of making a tea that will reduce high blood pressure and strengthen the nerves. The juice of the fruit is said to cure tuberculosis, sore throat, whooping cough, and quinsy, as well as relieve headache, and if applied to a wart will remove it. If everything attributed to the black currant is true the medical profession are wasting their time looking any further. In most cases among English families the same black currant bushes or cuttings from them have been in the family for several generations. When the family moves the bushes were also moved.

The Dutch were nearly as fond of their black currants as the English, but for the reason that they made a wine from them that was said to be quite good. Nothing else could quite take their place.

The Italian was the best of all persons to deal with. To the Italian, black currants had an odor like bed bugs, and they usually helped in the removal of the bushes.

Many of the people had never heard of any law against the possession of black currants, because the farm population in Wayne county is predominantly foreign and does not read the American papers. Even to the American farmer the law was something quite new to him, and no wonder. The black-currant law had been enacted first nearly 10 years previously and had never before been enforced by the State. Before any work was done in Wayne County several articles had appeared in local papers and announcements had been sent out by the Wayne County Farm Bureau. However, a longer program of educational work and greater use of the press is necessary. Perhaps the conditions would be different in the districts where blister-rust control has been carried on for several seasons; but in the parts of New York where most of the Ribes nigrum are found there has never been any blister-rust work carried on nor any publicity on the subject, although it seems to be very important that such work should have been done before.

It seems that the eradication of black currants has been rather neglected during most of the blister-rust program that has passed, most of the emphasis having been placed on the eradication of wild Ribes. The wild Ribes have been removed in most of the good pine stands and plantations, but the still more dangerous pest, Ribes nigrum remains. Because of their extreme susceptibility to infection and the open location in which they are usually growing there are no doubt places where one or two Ribes nigrum are still of more danger to the pine stand than the bushes that have been removed within the pine stand and in the protective area. To make a thorough job of the eradication being done it seems that the eradication of all Ribes nigrum, in the pine country already cleared of wild Ribes, should be carried out. Too little publicity has been given to this phase of eradication work.

When such a program of eradication is started, if started at all, property owners having Ribes nigrum should be placed on the same basis with owners who may have to lose any of the other kinds of cultivated Ribes. At present if a man loses a red currant he can get compensation for it, but if another man loses a black currant he is simply unfortunate in not being allowed compensation.

In most of the work carried on this past summer the Ribes nigrum were removed to protect nurserymen growing five-needled pines for sale. It seems only just that these nurserymen should have to pay for any black currants destroyed. The nurserymen would probably say no to such a proposal, but then it is just a case of his ox not being gored. In all the States where reforestation is being carried on to any great extent trees for plantations are sent out to anyone who places an order, without the State finding out what the Ribes conditions, and especially the Ribes nigrum conditions are on the site where the pines are to be planted, with the result that blister rust is afforded a wonderful opportunity to become established in new places.

If possible when any State sends out pines for reforestation some one should be sent to see that Ribes nigrum and other Ribes are removed, otherwise they are only inviting the spread of blister rust.

No special method was used during the past season in locating and eradicating bushes. In village work the village was marked off in blocks on a map. Two men were all that were employed in black currant eradication work and each was assigned a block / day. Beginning in the morning the men would visit every house in the block given them to be worked and thoroughly inspect the premises for Ribes nigrum. The word of the owner was not accepted for several reasons. Some of the owners purposely would try to make the men believe they had no black currants, and many not knowing what a black currant was would say they had none on their property when probably several were there.

Whenever a bush was located the owner was interviewed and the reasons for the removal of the bush were explained and literature left with the owner. The house number was jotted down and when both men had completed a survey of their block they met at an assigned place and started in to eradicate the bushes, which had been located. Some of the old-timers, which had reached tree-like proportions were no easy job for two men, even though they were armed with shovels and mattocks.

The amusing part of black-currant eradication experience is the eagerness most of the people have to see their neighbors get caught with bushes of the prohibited variety on their property. From helpful neighbors of Ribes nigrum owners we were usually informed of the location of the bushes in question before we had set foot upon the property.

Practically the same method of work was pursued in the country districts, the country being divided up into small blocks, which the two men with the use of a car covered thoroughly. In the country an average of

about 25 miles of road could be covered per day, but oftentimes the day's work was not completed until dusk. The number of calls made varied from 105 to 392, depending, of course, upon the number of bushes that had to be eradicated and the amount of argument necessary to convince some of the more obstinate owners of the necessity of the removal of their bushes.

SUMMARY OF INFECTION CONDITIONS IN SOUTHWESTERN VERMONT

By W. E. Bradder.

In Rutland County, Vermont, pine infection became established somewhat later than in other parts of the State. Cankers of origin previous to 1919 are comparatively scarce but during several seasons since, pine infection has increased quite rapidly.

Data collected recently on canker-age counts show that less than 8% of the total infection took place previous to 1919. The year 1925 produced very heavy pine infection in many towns. On the twenty-one lots examined for this purpose all but three showed 1925 cankers predominating. The years 1922 and 1924 also produced abundant infection. Cankers of 1925 comprised 34% of the total.

This data was collected while scouting and inspecting in the towns of Brandon, Pittsford, Proctor and Castleton.

USE OF CHEMICALS AS RIBICIDES

By William Clave

Skunk currants (Ribes Glandulosum Grauer) are found in abundance in the northern part of Worcester County, Massachusetts. Their natural habitat seems to be along brooks, damp runs and in the swamps that are not too wet. When found under these conditions they frequently cover large areas and are occasionally found in spots where they cover the ground completely to the exclusion of all other forms of ground cover. In the eradication of these bushes for the protection of white pine from the blister rust great expense is involved. The plant is of the creeping variety and the roots are usually found entangled in the roots of trees and other plants and in the moss of swamps. When pulled the currant roots break readily and consequently pieces of broken root are frequently left in the ground. These pieces sprout quickly and the young sprouts make a rapid growth. Furthermore, the bushes in this locality bear many berries and these give rise to a host of seedlings on some areas. These two factors make it necessary to re-eradicate within a comparatively short time. Still the main and most expensive problem is the initial eradication. The cost of eradication of this species of Ribes by a trained crew is so high that the less fortunate owners have found it impossible to have these bushes removed from their properties. In most cases it would take considerable time for an owner to clean up these areas and it is doubtful if a very clean job could be done by this method.

After the success experienced in the chemical eradication work in the western States on Ribes petiolare, it was thought worth while to conduct some experiments with that method of eradication in this district. In order that we might closely check the results of this work for a period of years it was decided to lay out well-marked plots in the skunk currant areas and to confine the spraying to these plots. In selecting the locations for the plots an attempt was made to include a variety of the conditions under which skunk currants are found in this section. Within the seven plots which we have sprayed we have included skunk currants growing along a brook, in a swampy area, on a fairly well drained soil, on a stone wall, spots where the other undergrowth is dense, medium and light and where the Ribes are growing on ledgy areas on a mountain side.

Four plots were completed early enough in the season so that we could obtain a check on the results while the Ribes were still growing. Each plot was laid out in the form of a square. The first three were 100' on a side and the fourth 50' on a side. The outside boundaries of these plots were marked by hardwood stakes set firmly in the ground at 10' intervals. From these stakes the plots were divided into 10' squares with an ordinary building lath, used as a stake, to mark each corner. The outside boundary stakes on one side of the plot were then lettered; the first A, the second B, the third C, etc. The other stakes in line with stake A were then lettered and numbered A1, A2, A3, etc., and those in line with stake B were let-

tered and numbered B1, B2, B3, etc., until every stake on the plot had a letter and a number. The plot was then gone over very carefully and the number of feet of live stem in each ten foot square was estimated. On the first few 10' squares encountered, the live stem was actually measured so that we might have something definite on which to base our estimates. After taking data on plot location, land owner's name, site, type and density of forest growth and kind and density of undergrowth the plots were ready for spraying.

Two different formulas were used for spraying solutions. The object was to compare their effectiveness. These formulas will hereinafter be referred to as formula A and formula B. Formula A consisted of 2.7 lbs. of sodium chlorate, 3 lbs. of calcium chloride and 0.003 lbs. of whale oil soap to one gallon of water. Formula B consisted of 2.7 lbs. of sodium chlorate and 0.003 lbs. of whale oil soap to one gallon of water. Formula A differs from formula B in that it contains calcium chloride. This was added because it was supposed to increase the effectiveness of the sodium chlorate. The whale oil soap in both formulas was to act as a spreader and sticker.

The whale oil soap solution was made as follows: One third pound of whale oil soap was cut into small pieces and dissolved in a small quantity of boiling water. When the soap had completely dissolved water was added to make three gallons.

The chemicals were mixed in the field and for convenience in handling were made up in twelve gallon lots. An ordinary galvanized iron wash tub was used in mixing the chemicals. The dry chemicals were mixed first, after which the whale oil soap solution and water were added.

The spray-pumps used were Smith Sturdy Hand-Pumps attached to a knapsack tank of five gallon capacity. We used their number three nozzle at the end of a 24 inch rigid extension.

Three men were used in spraying the plots. They were lined up as in ordinary crew-work eradication and each man was responsible for the spraying of the Ribes on a strip about six feet in width. Care was taken to spray the under as well as the upper surfaces of the leaves. The stems and exposed roots of the Ribes were also sprayed. No consideration was given any of the other growth on the plots.

The conditions of site and growth on plots #1 and #2 were about as similar as could be found and the plots were located within 200 feet of each other. They were selected because of their similarity so that a better comparison could be made of the effects of formula A and formula B. These plots were located along a brook which at this spot widened out to form a swampy area of about an acre. The forest type was hardwood with a few hemlock and young pine mixed in. The swampy area supported a growth of alders. Ribes were growing along both sides of the brook and were abundant throughout the swamp. Each plot was located so that it included a section of the brook and a part of the swampy area.

During a wet season parts of this area are under water; this was the case at the time the plots were laid out. Undergrowth consisted of ferns and grass with parts of the swampy area covered with moss. There was a deep layer of decayed and partly decayed leaves on the ground.

Plot #1 was sprayed in the morning of July 12th, 1928, and the work was started at ten o'clock. The weather was cloudy with a temperature of 80°F. Three spray-pumps were used for three man hours and nineteen gallons of formula B were sprayed on the Ribes.

Plot #2 was sprayed during the afternoon of the same day, the work starting at one o'clock. The sun had appeared and the remainder of the day was fair. Twelve gallons of formula A were used on this plot.

It was observed that by the time plot #2 had been completed the leaves of the Ribes on plot #1 had begun to curl. General observations were made on these plots from time to time until the first check was made. The Ribes seemed to go through a process of drying which resulted in complete defoliation over the whole plot. Ten days after the spraying took place new growth became noticeable on a few of the shoots which had not been killed. Some sprouting from the stem was noted at this time.

The first check on the results was made on Plots #1 and # 2 on September 14th. The plots were again gone over, one ten foot square at a time, and the live stem estimated. New growth had taken place since the spraying and a separate count of this was made. The new growth was easily identified because of the striking difference in color between the new bark, and the old bark which had been exposed to the chemical.

The results of the spraying on the first two plots are given together for comparison. They are as follows:

	Plot 1	Plot 2
Formula used	B	A
Amount of live stem originally	3364'	1885'
Original live stem left	637'	346'
New growth	63'	61'
Total live stem on first check	700'	407'
Percent original live stem killed	81.1	81.6
Perdent reduction of live stem	79.2	78.4

No appreciable difference could be noted in the effectiveness of the two formulas used as spraying solution.

Plot #3 was located in a damp run in a hardwood forest type. It was 100' square with Ribes on almost the entire area. Most of the plot supported a medium growth of alders and the ground cover consisted of dense ferns, hardhack and berry bushes. Ribes were concentrated around the roots of the alders and scattered throughout the berry bushes and ferns. This plot was sprayed with formula B on July 16th, 1928. The day was fair

and the work began at 10 A. M. The temperature was 68°F. Three sprayers were used and 24 gallons of the chemical were sprayed on the area in the same manner as in the first two plots. The check was made September 17th, 1928. The results were as follows:

Plot # 3.

Formula used	B
Amount of live stem originally	7050'
Original live stem left	1928'
New growth	421'
Total live stem on first check	2349'
Percent original live stem killed	72.7
Percent reduction of live stem	66.7

Plot #4 was located adjacent to plot #3. This plot was 50' square and largely covered with Ribes. The Ribes were more concentrated and on about one half of the plot the growth of raspberry bushes and hardhack was exceedingly dense. A stonewall divided the plot in half and Ribes were growing all over the wall. The density of the other undergrowth made the spraying more difficult but the type of spray-pump used was equal to the task. This plot was sprayed with eleven gallons of formula A. Three sprayers were used for two man-hours. The work was started at 1:30 P.M. on July 16th, 1928. The day was fair with a temperature of 70°F. The first check on this plot was made September 17th. The results were as follows:

Plot # 4.

Formula used	A
Amount of live stem originally	3953'
Original live stem left	1270'
New growth	223'
Total live stem on first check	1493'
Percent original live stem killed	67.9
Percent reduction of live stem	62.2

An attempt was made to explain why a high percentage of kill was obtained on one 10' square and a low percentage on others in the same plot. No general rule could be drawn to account for this difference. Of course, in spots where the roots were more exposed the percentage of kill was higher.

The following is a summary of the results on the four plots checked:

Amount of live stem originally	16,252'
Original live stem left	4,118'
New growth	768'
Total live stem on first check	4,949'
Percent original live stem killed	74.2
Percent reduction of live stem	69.6

Some criticism has been directed against spraying work because of the fact that it killed trees which were growing among the Ribes sprayed. Outside of a very few alders which were worthless there were no trees killed on these plots. It is true that there were not very many hardwood trees on the plots but these few did not show any damage.

While the percentage of live stem killed by the spray is encouraging, the experiments so far, have not shown greatly to our advantage. It does not appear that a very large percentage of the plants were completely killed and sprouting from the live stem and roots has taken place over all the plots. The majority of these sprouts have started from the live stem at points just above the surface of the ground. Some of these sprouts had made two or three inches growth at the time of the first check. Where the terminal bud was not killed by the spray as much as twelve or fourteen inches of new growth was noted at the time of the first check. If the sprouts are able to survive the winter it will not be very long before the Ribes conditions on these plots will be as bad as before the spraying work was started. If the roots are not killed spraying simply reduces the amount of live stem for a short period.

In an attempt to kill the roots by spraying, three plots were laid out on the side of Wachusett Mountain during the latter part of September. Ribes glandulosum were concentrated on all of these plots and were growing on ledgy ground in a hardwood forest type. One of these plots was sprayed on the 24th, of September and two on the 27th. Formula B was used on all of them. On two of these plots some of the leaves of the Ribes had already fallen and the others were about ready to fall. On the third plot the Ribes were completely defoliated. These Ribes were thoroughly sprayed and a large amount of the chemical was forced into the ground around the roots by holding the nozzle of the pumps close to the ground surface. These plots cannot be checked until next Spring, but we hope that either the chemical has killed the roots or, at least, has so weakened them that they will not be able to survive the winter.

Formula B was also tried out on Ribes cynosbati L. growing in an open pasture. Sixteen bushes were marked by stakes and then thoroughly sprayed. This work was done on September 27th. Most of the bushes still retained their leaves. The outcome of this experiment is doubtful due to outside interference. When we started spraying, some cows in an adjoining pasture evidently smelled the salt, and they immediately joined us. They followed us around licking the tanks on our backs when they got a chance and licking each bush after we had sprayed it. Enough of the chemical may have penetrated the ground to accomplish the desired result. This plot, also, will be checked in the Spring of 1929.

THE WILLOW SCAB DISEASE

By G. P. Clinton

The Willow Scab-blight was first noticed in this country, so far as we have been able to ascertain, at Norfolk, Connecticut, in the spring of 1926. It was called to the attention of the Botanical Department of the Connecticut Agricultural Experiment Station in the late spring of 1927, and was then first definitely determined as caused by the scab fungus, Fusicladium saliciperdum. This fungus had not been reported previously from this country; however, it had been described in Europe, and occasionally it had caused sporadic injury in Germany, Holland, Scotland, and some other European countries.

In 1927 the disease was also reported in New York and Massachusetts in regions contiguous to the Norfolk area in northwestern Connecticut. It was found by the speaker in August in Nova Scotia, where it was causing even more serious damage, and in New Brunswick in a less conspicuous way.

In 1928, it was found in at least a dozen towns in northwestern Connecticut, and in Massachusetts along the Mohawk Trail from the Connecticut line as far north as Pittsfield and eastward it was seen at Northampton and vicinity. In New York it was again reported a number of times in the general region adjacent to Connecticut. The fungus was also collected in New Hampshire in the region of Kenne, and was reported from Vermont in the Bridgewater valley. In Maine it was very conspicuous all the way from Calais to Bath along Highway No. 1; it was especially bad in Hancock county. It seemed to run out in the region of Kittery, and was not seen further south to the Sound. So far it has not been reported from Rhode Island. A visit to Canada showed that it was unusually bad in the greater part of Nova Scotia including Cape Breton Island, in Prince Edward Island and in New Brunswick from Cape Tormentine to St. Stephens, where large willows are frequently grown as street and shade trees.

This is one of the most aggressive and destructive diseases that the speaker has ever seen. Hundreds of trees two feet or more in diameter have been seen which were killed, or fatally injured. The disease attacks the developing leaves in the spring causing them suddenly to rot and dry up, often remaining for some time on the twigs. The fungus spreads down along the mid-rib through the petiole into the young twigs, producing cankers and finally death of the same. The destruction of the leaves and twigs so early in the season two or three years in succession eventually causes the death of the larger branches and trunks, although these parts are not infected directly by the fungus. Not all of the infected leaves and twigs show the fruiting stage of the fungus, but when present it appears as olive-green pustules thickly clustered along the main veins of the leaves.

The saprophytic stage of the fungus is said to be a Venturia but has not yet been found in the United States though reported in Greenland

years ago. The parasitic stage has been reported on over a dozen species of willows in Europe, and on a lesser number in this country, some of them the same as the European species. One species that is most persistently and seriously injured here is the large yellow-twigged willow known as Salix alba var. vitellina which is common in cultivation. The white willow, Salix alba, so far has rarely been found to be attacked. The bay-leaf willow, Salix pentandra, seems more or less resistant, while the weeping willow, Salix babylonica, apparently is immune.

This fungus was obtained in culture by Dr. Florence A. McCormick of our department and inoculations were made at the Station farm at Mt. Carmel in a region in which the disease does not occur, on several varieties of basket willows. The disease was produced on them the same as it occurs in nature, so there seems to be little question about the cause of the injury, which previously had been somewhat open to doubt, and which Mattrass of England recently claimed is caused by another fungus.

Spraying experiments were also conducted at Norfolk both with Bordeaux mixture and lime-sulphur. Four trees received four or five treatments, the first on the dormant twigs and the others on the very young, half-grown and fully grown leaves. These were the only trees in the village that retained an appreciable amount of foliage during the year. As the sprayed trees already had a large proportion of their young twigs killed from previous attacks, the results were even better than the amount of foliage indicated. It appears, therefore, if one wishes to go to the expense of thorough spraying that susceptible trees can be protected against further injury by this fungus, provided that they are not too far gone before the treatment is started.

Question: What do you think is the best treatment for this willow disease?

Answer: I would recommend four or five sprayings with Bordeaux - one dormant; one just as buds are opening up; one when leaves are two-thirds grown, and when leaves are fully developed.

Question: What is the known distribution of the willow scab disease?

Answer: This disease has been found in all New England States, except Rhode Island, adjacent in New York, and in Nova Scotia, and New Brunswick.

Following Dr. Clinton's talk on "The Willow Scab Disease," Dr. Spaulding called the attention of the conferees to some specimens of the European larch canker. As he gave a detailed talk on this disease at the 1927 conference, Dr. Spaulding merely described the important phases of the disease, after which stereopticon slides were shown and explained by Dr. Howard, preliminary to his field demonstration of the disease on Douglas fir. Before making the field trip, Dr. York briefly summarized the status of the Woodgate rust for those present who were not acquainted with the disease.

SKUNK CURRANT ERADICATION

By S. D. Conner

For the last few years I have been on rather intimate terms with our old friend, skunk currant (Ribes glandulosum Grauer), and yet I know very little about him. You know that after all, most persons can be divided into two classes. First, we have the thinkers who are broad between the eyes and narrow across the back, and second, we have the laborers, who are broad across the back and narrow between the eyes. Environment, necessity and all those other factors which influence mens lives have, unfortunately made me a member of the latter class and this may be the reason why I have been pulling these bushes and hanging them up since 1917 and yet am not prepared to propound any new theories on skunk currant eradication. Most of you men here know as much about this problem as I, and I honestly feel that some of you have forgotten more about the subject than I ever knew. Therefore, I shall not attempt to advance new theories for the elimination of the species, but my purpose is rather to suggest some of the well known facts in the hope that some of you will be able to suggest changes that will materially speed up skunk currant eradication and at the same time increase the efficiency and lower the cost.

This subject of skunk currant eradication seems to divide itself naturally into three divisions or problems. The first: Under what conditions and at what season should we eradicate skunk currants?

Our job as blister-rust control agents is to protect pine from blister rust. The thought occasionally occurs to me; do we sometimes lose sight of the real object of our work and consider ourselves as agents delegated to destroy Ribes? while we must destroy Ribes in order to give the pine adequate protection; I am convinced that in my own work I have too often carried the protective strip a longer distance from pine than was necessary to give ample protection. When we start in to work a protective strip in a swamp full of skunk currants, I believe there is a tendency to becomes 'Ribes Fiends' instead of blister-rust control agents. Of course, shielding and prevailing wind direction must be considered, but even so, I wonder if there is not a general tendency to make our skunk currant protective strip wider than is absolutely necessary. If conditions warrant reducing the protective strip it would materially reduce the cost of protection.

In Maine, skunk currants are our most expensive eradication problem. The reason for this is their location and the large number of bushes per acre. The cost is usually in direct proportion to the number of plants present per acre, but topography and under-cover are also factors to be considered. In our State, the skunk currant is the first Ribes plant to become defoliated and this defoliation often begins as early as the latter part of July. The amount of infection and the general site in which the plants grow may be the factors which determine the time of defoliation although the amount of rainfall during the summer apparently plays an important part. This early defoliation makes the season for

the most efficient skunk currant eradication very short. Another factor, which tends to shorten the eradication season from the other end, is the fact that fully fifty per cent of our skunk currant eradication jobs are in swamps and these swamps are usually full of water in the spring and therefore inaccessible until about the first of June. This means that skunk currant eradication must be started as early in the spring as possible and completed by the last of July if most efficient work is to be done.

The second division that suggests itself is: What methods should we use to eradicate skunk currants?

Two methods stand foremost. Hand pulling and the use of chemicals. In Maine, we of course, find skunk currant growing under various conditions and in many localities but in general they seem to have three favorite haunts: (1) Swamps, (2) Mountain ledges and (3) Slash areas. Assuming that the same number of bushes per acre are present in all areas, the cost of eradicating the Ribes in swamp and mountain ledges will be about the same while the eradication cost in slash areas will be higher, due to the fact that slash makes eradication difficult. This is especially true where the slash has been piled in windrows and the bushes are growing up through the piles. Here it is necessary to pile over the slash in order to get the bushes and this is expensive.

In confined areas of swamp land or on ledges it sometimes happens that the ground cover is almost entirely composed of skunk currant. This means slow, careful work for a crew using hand-pulling methods but in areas of this sort or in slash; would not chemical eradication be cheaper and possibly more effective? Mr. Newman's experiments with chemical eradication will undoubtedly throw some light on this question. Even after we have agreed that chemical eradication of skunk currants is practical under certain conditions, we must learn something of the chemical eradication methods in order to apply them efficiently to our local conditions.

The third division associates itself with the efficiency of skunk currant eradication and the re-eradication of skunk currant areas.

From my personal experience it would seem that the efficiency of skunk currant eradication is more dependent on the character of the foreman and the general morale of the crew than on any other one factor; although season of the year, ground cover and the number of mosquitoes per cubic inch of swamp atmosphere are worth considering. Where the ground cover is a solid mass of skunk currant, the eradication must necessarily be slow, systematic and very carefully done. In general, I believe that the efficiency of our skunk currant eradication is above, or at least equal to that of other species. In concentrated areas, there are usually more skunk currants per acre than we generally find of other species and therefore, if we remove the same percentage on the initial eradication, we are nevertheless leaving more skunk currants per acre than of any other species. In fact, it would be possible to eradicate a skunk currant area and take out 95% of the Ribes and at the same time we would be leaving more Ribes per acre than a gooseberry-infested area might originally have.

It therefore stands to reason that re-eradication of skunk currant areas would be advisable a few years after the initial work was completed. On the other hand, Dr. York's experimental conclusions on eradicated skunk currant areas have been borne out by my own experience and many times I have found that skunk currant areas that showed about 95% efficiency immediately after eradication (and looked terrible the following spring) were almost entirely Ribes-free three years later. This seems to indicate that disturbing the root system and the duff around the plants during the initial eradication so weakens them that they are unable to survive in competition with associated vegetation.

In closing, the points I wish to leave with you for consideration are: (1) Under what conditions are we justified in eradicating skunk currants and during what months should the work be done? (2) Can we improve our skunk currant eradication methods? (3) When should we re-eradicate the skunk currant areas?

RIBES SUBSTITUTES

By Geo. M. Darrow

The currant and gooseberry are used largely in making jelly, pies and jam. Small quantities of both are used for sauce, but rarely eaten out of hand. The currant is held in high esteem because of the color, tartness and consistency of the jelly made from it. The gooseberry is not generally as highly regarded in this country as the currant, but is prized for making jelly, pies and jam. Consideration of substitutes should be based on their value for such uses. Two other considerations should also be borne in mind. On the one hand, the loss of even minor crops like the currant and gooseberry retards progress toward an advanced more stable agriculture and horticulture based on the culture of many crops; on the other hand, research in utilization has resulted in finding better ways of preparing the more widely produced and cheaper crops which compete with the more restricted crops such as the currant and gooseberry and tend to make them horticulturally of less importance. Although giving up currants and gooseberries may seem like a step backward, progress in the utilization of other fruits may lessen their intrinsic value.

Probably apple jelly is best fitted to replace the currant and gooseberry. The raw material is widely available, cheap and has a wide range of characteristics. Studies by Lathrop of the National Preservers Association in 1927 have shown that the fruit of the common flowering quince contains as high as 5.5% of malic acid and may be used to tone up and give a much finer flavored apple jelly than is commonly obtained. An even greater improvement in the jelly is made when the flowering quince is used with the common quince.

The use of commercial pectin is making it possible to produce strawberry, raspberry and other jellies of the finest flavors. Extended use of this pectin tends to make currant jelly of secondary importance. Better transportation and refrigeration facilities are steadily bringing to the reach of more markets a greater variety of fruits which replace the need for the fresh fruit of the currant and gooseberry.

A dwarf-growing highly-colored crabapple would be one of the most desirable Ribes substitutes, but as yet we do not know of such sort. The American cranberry-bush is a satisfactory jelly substitute for those who like the characteristic highly flavored highly-colored jelly made from its fruit. Its bush is remarkably ornamental and hardy. Seedlings of selected varieties became available for the first time last winter. Selections of the Chinese bush cherry, Prunus tomentosa, have been propagated and distributed. In general, however, its blossoms are often caught by late spring frosts, and crops of it are apparently no more certain in the northern states than with the peach. Its bush is hardy far north into Ontario, Minnesota, and North Dakota. Where crops can be obtained with reasonable regularity it is a useful jelly fruit. The New York Cooperative Fruit Testing Association, Geneva, N. Y. has propagated one selection of this cherry for sale to members of the Association. The American cranberry-bush and the bush cherry are still the two most promising new Ribes substitutes, but are both still for testing rather than for commercial culture.

RIBES ECOLOGY

By A. E. Fivaz.

This past season we completed the study of our 115th plot in the Ribes Ecology investigations. This study is aimed at the determination of the relationships between the number of Ribes and the amount of live stem, and some of the more important factors which influence these, such as age and density of forest stand, and history of site. Our object is to learn as much as possible about Nature's way of controlling Ribes growth, so that in artificially controlling Ribes for the protection of white pine we may make full use of any assistance that Nature may afford. The present study is limited to G. rotundifolia (Michx.) Coville & Britton until definite conclusions may be drawn for this species. Then, similar investigations will be carried on for other species by field comparisons with rotundifolia under corresponding conditions of site. The 115 plots already completed average nearly 1/4 acre in size and are scattered under different site conditions in Warren County, New York. Careful data were recorded on all Ribes, regardless of species but principally rotundifolia, found on these plots. We know the number of feet of live stem of each bush as well as something about the age, the past history and the future prospects of each individual. Thorough descriptions of each plot were taken, and from data on number of trees and stumps by diameter classes and species, we have computed with a fair degree of accuracy, the basal area of the forest cover at the time of examination as well as at each 10-year point in the past 60 years. In other words, we have fairly good date on the forest, and Ribes history for many years back on 115 plots within the G. rotundifolia range. These data have not been completely summarized, therefore the results are not yet available. We hope to obtain final results for G. rotundifolia before the next annual conference.

General observations in the field and familiarity with the partial summaries, however, lead me to believe that these data will furnish valuable information which will have a practical application in control work and will help to reduce the cost of maintaining control. A few tentative indications which seem likely to be borne out when the data are thoroughly analyzed may be useful to the field men by preparing them for the application of final results. In advancing these points, I will discuss tentatively their practical application.

Apparently, G. rotundifolia, the so-called smooth gooseberry of New York State, does not retain dangerous size, from a blister rust standpoint, under dense coniferous shade. If this is a fact that will apply to all our northeastern species of gooseberries, it has several important applications in our work. First, from a blister-rust control viewpoint, the pine owner should be advised to secure full stocking in his pine types as soon as possible after cutting or fire. This will reduce to a minimum the period of time favorable for Ribes growth in each forest rotation, and will reduce the number of Ribes eradications necessary to

to bring each crop to maturity without commercial loss from the disease. Second, most of the uniformly fully-stocked pine sites may be said to be protected from blister rust if the number and size of Ribes remaining over from a more open condition are not too great. This is seldom the case, and perhaps scouting may therefore be substituted for crew work on most areas that are uniformly fully-stocked to white pine over 20 years of age, thereby reducing the cost of control. Similarly, under such conditions, re-eradication will not be necessary to protect the pine of the current rotation, unless the shade of the forest canopy is reduced by fire, cutting, windfall, insects or fungi. The protective strip, of course, will need different treatment if it includes more open types.

We have good evidence that the seeds of some species of Ribes may remain dormant but viable in the duff and humus of the forest floor for many years, germinating when the forest floor is disturbed. This is of great importance, for our eradication practice does not include the elimination of viable seed that may be lying in the forest floor. Your crews may remove 100% of the Ribes from a given area, yet if you disturb the duff over that area you may cause the germination of one hundred times as many Ribes as were removed in the first place. This is happening right along, in somewhat modified form, in our eastern pine areas that are being cut, burned or windthrown. The field man should consider the areas that have been cut, burned or windthrown within the last teh years as the blackest spots on his map; as the areas that need his attention the most, regardless of whether or not eradication preceded the disturbance. When our work becomes largely re-eradication, I foresee that we will have to keep records of each lumbered, burned and windthrown area, in order to permit us to advise the re-eradication of such areas at the proper time before the resulting Ribes have done appreciable damage. Since it takes from three to eight years for Ribes to attain size permitting effective eradication, following such disturbances, it would be well for field men to begin their records of such areas now, in preparation for the re-eradication problem in the near future. The indicated fact of longevity of Ribes seed also emphasizes the necessity of removing every fruiting bush in eradication work. It may also prove practicable, when final results are obtained, to advise that logging be carried on with a minimum of ground disturbance on pine sites, such as in deep snow.

The data indicate that old fields in their first forest crop since cultivation have few Ribes and regain a dangerous Ribes status very slowly. A surprisingly high percentage of our pure pine is growing on old fields and pastures, many of which have been abandoned within the last 75 years. On the old fields we have an excellent opportunity of permanently eliminating Ribes if all seed sources are thoroughly removed. The eradication work along stone walls, streams, roadsides and near cellarholes in country that is "going back" to pine is of critical importance, not only from the immediate hazard of disease spread, but especially from the standpoint of eliminating sources of seeds. Birds and rodents are known to distribute seeds, and only by eliminating seed sources can we

prevent them from being an important factor in our control work. Cultivated red currants, to my way of thinking, are dangerous as seed sources within at least one-half mile of pine groves. The Faxon planting, within 1-4 mile of Chestertown where cultivated red currants are grown, was a cultivated field not more than 45 years ago. Still, on the 2-3/4 acres of this plantation, my crew removed 162 escaped red currants and 8 gooseberries, or 62 Ribes per acre. It is not unlikely that every one of these came from seed introduced into this area by birds and rodents, chiefly birds. We cannot be too careful in eliminating all possible sources of seed. In this case the shade is heavy and the Ribes small; the danger of their presence applies more to the reproduction that will follow a thinning or logging, rather than to the present stand.

The few points I have discussed are of course tentative. They are based on observations for but one species whereas we have eight or more to deal with in the Northeast. This work must be extended to other species and results obtained without delay, so that we may be better equipped to tackle the re-eradication problem. Later it is probable that field schools will be held for the Agents for the purpose of studying at first hand the ecological phase of control work.

MANAGEMENT OF WHITE PINE WOODLOTS

By John H. Foster.

We are so accustomed to think of woodlots in terms of their protection that it is well to sometimes consider them as objects for silvicultural improvement and management. By so doing we gather inspiration for still greater effectiveness in protection. The average white-pine woodlot on Quality I soil and reasonably fully stocked is producing timber at a really marvelous rate. I have been looking up growth figures in connection with out forthcoming reports on forest taxation and feel again the enthusiasm I used to feel for the great possibilities of the future in growing white pine.

Most data heretofore used in connection with growth and yield were collected by Louis Margolin of the Forest Service during the preparation of his field study and report on white pine in southern New Hampshire about 1905. This was published in the biennial report of the Forestry Commission at that time. About ten years later E. H. Frothingham of the Forest Service in preparing Bulletin No. 13 of the U. S. Department of Agriculture, "White Pine Under Forest Management," used much of Margolin's field data but worked it up somewhat differently. He determined the three quality conditions according to height growth and used basal areas in computing volumes per acre. His yield tables are therefore somewhat different from Margolin's original tables and are probably superior. According to Bulletin 13 the average growth of white pine varied roughly from 1,000 board feet for Quality I down to 600 board feet for Quality III, annually. The results of cutting of even-aged stands where measurements are taken before and after bears out the figures of the tables fairly well. In applying yield tables to determine how white pine stands run per acre we need to consider carefully the site conditions which in turn should be dependent on quality of height growth. Density of the stand is also important as well as mixtures of species and suitable deductions must be made for both in applying yield tables. The time has not come when we can determine yield of mixed stands or uneven-aged types accurately.

A word about thinnings. Professor Hawley in Bulletin 20 of the Yale Forest School describes the results of measurements of thinned and unthinned plots made at intervals since 1905 in the vicinity of Keene, N. H. These results show very clearly the benefits from thinning. He enumerates 10 or 11 concrete reasons for making thinnings and compares heavy thinnings with light thinnings showing that heavy thinnings not only give larger returns but because they leave less wood capital and thereby reduce the value tied up in the forest, at the same time produce new wood at equal if not greater value. Of course, heavy thinnings do not mean reproduction cuttings but opening up of stands by taking out some of the dominant trees where necessary to give the remaining trees sufficient room. A light thinning does not enter into the dominant class much if at all. The thinnings should not be so heavy as to promote the growth of inferior reproduction. Early and late thinnings are also considered and it is

obvious that thinnings should be made before 35 years and gradually in order to give the forest the greatest benefit. Thinnings after 35 years however are desirable.

We have very little data on pruning but an excellent bulletin has been prepared by Cline and Fletcher entitled "Pruning for Profit," and published by the Harvard Forest School and the Massachusetts Forestry Association jointly. This bulletin treats of Mr. Pratt's work at Holderness, N. H., which is well known and extremely interesting. It is shown that one man in two days can prune an acre up to 16 feet in height and thereby probably double the stumpage value after 20 to 30 years if the thinning is made before the trees are 30 years old. The cost should not exceed $ .50 per M and it is good business to prune only the dominant trees which will make the highest class lumber when cut.

A great deal might be said about pure stands versus mixed stands of pine and hardwoods. Professor Fisher seems to be our best authority on mixed stands and one should be familiar with his observations at Petersham, Mass. He has published some excellent bulletins. I would refer particularly to Bulletin 7 of the Harvard Forest entitled "Quality and Growth of White Pine as Influenced by Density, Site, and Associated Species." It may be of interest for our blister rust men to thoroughly understand the two types of investigations going on in New England, namely those at the Harvard Forest at Petersham and at the Yale Forest at Keene. The first related to pine, hardwoods and mixtures and the second largely to white pine in pure stands. Whether one or the other shall be grown depends after all upon soil conditions which we cannot control. Professor Fisher at Petersham deals with better soil conditions and therefore the forest should tend to produce mixed growth. By careful management he encourages the better species of hardwoods such as ash and oak and grows them with white pine. Professor Toumey at Kebno is growing pure stands of white pine for the most part because his soil is not adapted to hardwoods which grow only as weed trees and he is endeavoring to develop pine and has less difficulty in checking the hardwoods.

Our white pine forests generally are not fully stocked. Much of the hardwoods growing with them is of poor quality but nevertheless the mixture tends to improve the pine and will make us better forests in the future than if our poorly stocked pine areas were growing alone. There is the problem however of preventing sprout hardwoods from killing back pine reproduction in the early stages. We should make improvement cuttings or cleanings only where inferior hardwoods are actually holding back the pine. Problems of management are vastly different from now on than they have been in the past because our white pine of the future must be grown on cut over land instead of old fields and pastures which was the situation a rotation ago.

There is not time to speak of markets, planting and taxation. I am convinced that ultimately white pine will command high prices even as it does today if we can produce the highest quality timber. Taxation is

a problem which must be solved at least in New Hampshire if we are to bring white pine into its own. No other problem unless it is actual protection of our forests from fire and blister rust is so important as relieving the owner of burdensome taxes during the long years he must wait for his pine to become merchantable. I wish we might say that this problem could be solved in New Hampshire this coming year.

INFECTION CONDITIONS IN MAINE

By W. O. Frost

Blister rust was first found on white pines at Kittery Point, Maine, in 1916,,where it had been firmly established for many years. Scouting during this year produced a few scattering pine infections and a general Ribes infection far to the northward and eastward.

More scouting was done during the next few years but very little new pine infection was discovered; it was not in evidence, but study plots made in later years show that there were scattered pine infections dating back to 1904 and 1905.

During the past eight years, strip lines and many sample plot studies have been made throughout the pine belt in the State, the results of which show that the situation is serious, much worse than the general public believes. Ten years ago one had to spend considerable time finding a good example of blister rust outside of the Kittery Point area. Today they are in evidence from Kittery Point to northern Aroostook County, wherever pine grows. It was but a few years ago that a price of $5.00 was offered to the first eradication crew member finding a pine infection. Competition was keen and considerable time lapsed before the price money was earned. Today more time would be required to earn the prize if it were offered for a clean pine lot. A map of the State showing infected towns shows very few clean townships in the pine belt, and it is safe to say that the blank towns if scouted would be included among the infected.

Records of studies made by taking sample plots in many towns in the southern half of the State, showing the size of the plot, number of trees examined, their average height, the number and percent infected, the number dead or dying, stem and branch infections, and above all, the number of infections by years, show infection in reproduction varying from seventeen to ninety-five per cent.

The following table based on one sample plot to a county, shows what we find conditions to be in southern Maine after blister rust has had its run for several years on unprotected pine areas. The 10 plots total about 2-1/2 acres containing 1,511 white pines of which 943 or 62.5% are infected with blister rust. This is in marked contrast to protected areas where new infections on pine are scarce. The eradication of Ribes effectively establishes control of the rust on pine areas.

County	Year	No. Trees	Av. Ht. ft.	No. Trees Inf.	% Trees Inf.	Size Plot (acres)	Number trees Infected by Years 14 - 15 - 16 - 17 - 18 - 19 - 20 - 21 - 22 - 23 - 24 - 25 - 26
York	1926	239	6	145	60	1/4	23 32 26 16 33 15
Cumberland	1927	151	24	132	87	"	3 21 35 35 13 4 7 3 5 0 1
Oxford	1928	100	25	67	67	"	7 8 18 14 17 20 12 4 0 2
Androscoggin-Sagadahoc	1924	158	12	142	90	"	8 16 62 181 248 79 26 3
Lincoln	1927	233	6	112	48	"	3 27 22 15 19 14 9 3
Knox	1926	125	8	47	38	"	1 5 14 4 10 12 3
Waldo	1928	205	12	95	46	1/2	Previous to 1917, one infection. 1917-21, fourteen infections. Since 1921, eighty infections.
Kennebec	1928	100	8	43	43	1/4	1 4 6 2 4 3 8 11 7 4 2
Hancock	1927	100	6	65	65	1/8	1 19 38 5 15 18 4
Somerset	1928	100	10	95	95	1/10	(Fifteen-year old plantation.) 2 18 41 90 104 99 52 13
Totals		1,511	-	943	62.5	2.48	

THE PSYCHOLOGY OF SECURING COOPERATION FROM THE AVERAGE INDIVIDUAL.

By A. B. Graham

To be well informed as to the subject-matter we have immediately in hand is quite necessary to the success of any line of work, but the ability to cause others to feel that they should know the subject leads one into the field of teaching. The great teachers who have stimulated others to learn or to acquire information for their own use have rendered a service to the world equal to or greater than the one who simply acquires information. However, both are necessary. Information is the fountain head. Teaching power is the dynamic force in the stream running from that fountain head to touch the lives of all the people. It is not necessary that we have the complex knowledge of the psychologists but we can depend upon some of the general characteristics of human nature to guide us in the stimulation of other people to use their own will.

The process of instruction works from the outside in. That is, we give and assume that the other person receives, whether he will or not. They are told and whether we say it or not, the implication is "There it is, take it or leave it."

Teaching is a process that works from the inside out. The feeling or pressure that arises in one to accomplish, to do, to possess, to be recognized, to be esteemed, to be a recognized power, etc., places the learner in a state of desire to possess that which will help him attain his desired end.

In order to accomplish either the learning process or to develop a spirit of cooperation in people, we must in some degree put ourselves in their places. We must understand their limitations, their habits of life, conditions under which they live, and what influences affect them. In order to do this we must be able to diagnose human nature just a little. We must learn to set up attainable ideas, and through that attainment they must come to an accomplishment of a realization of the new ideal through a desire to experience the pleasure or comfort that will result from the establishing of a new habit over that of the old.

The first group of people are characterized by their force and ability to drive through a piece of work to completion. This is called initiative. They also have ideals and visions, or the ability to formulate some plan of action. This is called imagination. These two, initiative and imagination, dominate.

Two other characteristics are intelligent and instinctive imitation. Everybody has the four characteristics, with some one of them dominating, and the others recessive. Perhaps, generally speaking, 1/8 of the people are characterized by a dominancy of initiative and imagination. This group is always to be found where leadership is desired. The outstanding men and women in the church, in the grange, in the organization of a picnic or automobile tour-- these same persons are to be found. As a rule, they are the ones who get ideas first, and act upon them. They are the ones on whose farms or woodlots demonstrations are usually made. They are the ones on whose farms or in whose homes meetings are usually held. They are the ones about whom the newspaper story is first told, and whose experiences are related. They are cited or referred to as setters of examples.

The second large group - perhaps more than 3/4, if not 7/8 of people everywhere belong to this group - are characterized by their ability to intelligently imitate or to instinctively imitate. Initiative and imagination are quite recessive or sit in the background. Those having intelligent imitation we frequently hear say "I can do that." "Why have I not thought of it?" They can interpret or understand but they must follow some one with sufficient intiative and imagination to lead the way.

Those in whom instinctive imitation to dominate do things simply because somebody else has taken the lead and done them successfully. They do not take the time or trouble to think the matter through. They do it and justify it later by some reason which may be their own but which more probably they have picked up from somebody else.

Since this group of people make up the large mass of tax payers and voters, a great variety of means and agencies for stimulating them to action must be resorted to. Their attention must be secured by means of lantern slides, slogans, rhymes, short news items, and general talks. Even the effect of these influences, if not followed by others, will leave them without sufficient impression to remember, or without stimulating enough force to act. By repetition of presentation, interest may be aroused from the continuation of the idea and the repetition of the thought. The initial presentation must be braced up in other ways. The same lesson may be presented on a tour as has been presented in a news item or a movie. The field meeting or demonstration will teach the same lesson as was first presented in a slogan or lantern slide. There must be that continuity and repetition of presentation until the conscious mind holds the thought in complete possession, and about which a conscious want or desire is built up. Whatever the means or agencies used in building up this desire it must appeal to some inherent longing of the individual.

In general terms, there are five of these appeals. The economic appeal may be the first that comes to our mind. The control of blister rust must save money, it must make possible the marketing of a product that otherwise would have little market value.

The second is the appeal to the desire of extended life, or to look after the interest of the offspring. It builds a better house for our comfort, it preserves a forest for a future generation.

The third is the appeal to the ego, or the self interest. The possibilites of cleaning up blister rust helps an individual to be known among his neighbors as an up-to-date, progressive individual. It makes possible his possession or acquisition of a certain influence. It helps him to say to others - "I always knew it," or "I told you so."

The fourth is the altruistic, or the desire to help others. The person who is willing to pull up gooseberries and currants for the sake of protecting the white pine of his neighbors is manifesting a spirit of altruism, and occasionally there are those persons who may be appealed to through this. He is willing that he shall help his community. He may not be so willing to help some one individual in it, but taken collectively, he is usually glad to do it.

The fifth is imitation. We are all inclined to do what others have succeeded in doing. If the picture of the result can be consistently painted for us, we are always appealed to to do something because a number of persons, the crowd, does it. We do things that another individual we have confidence in has done. Lantern slides, news items, posters, slogans, stickers, markers, results of demonstrations, circular letters, exhibits, and talks should be interspersed with material covering some or all of these appeals, if the subject lends itself to such use.

Our time need not necessarily be spent in an endeavor to make a fine spun analysis of human behavior, but just a general knowledge of how it acts can be advantageously used, as has been previously suggested. The inventiveness and genius of the worker, once these fundamental ideas are in mind, can work out innumerable types of demonstration that will appeal to the two groups of people through the five appeals enumerated above.

A chart showing the means and agencies used to secure attention, develop interest and lead to action, follows on page 39.

Question: Suggests a copy of Mr. Graham's chart be sent to all present.

Answer: If desired, a copy of this chart will be sent to all. (Will be included with conference report.)

Question: Have you any suggestions as to how to plan an educational campaign to assist in eradication of Ribes nigrum?

Answer: It requires patience - through community talks, demonstrations, circular letters, news items, etc. An appeal should

not take on a compulsory note, but should be chocolate-coated as much as possible. Don't persist in an argument with a man who is inclined to be stubborn. You should say, "Perhaps you are right, there is something to what you say, but think it over."

Question: How can a non-committal person be made to make a definite statement?

Answer: Cannot do it - he is not going to do it. While there are high pressure ways of going after him, it is better not to have him say anything.

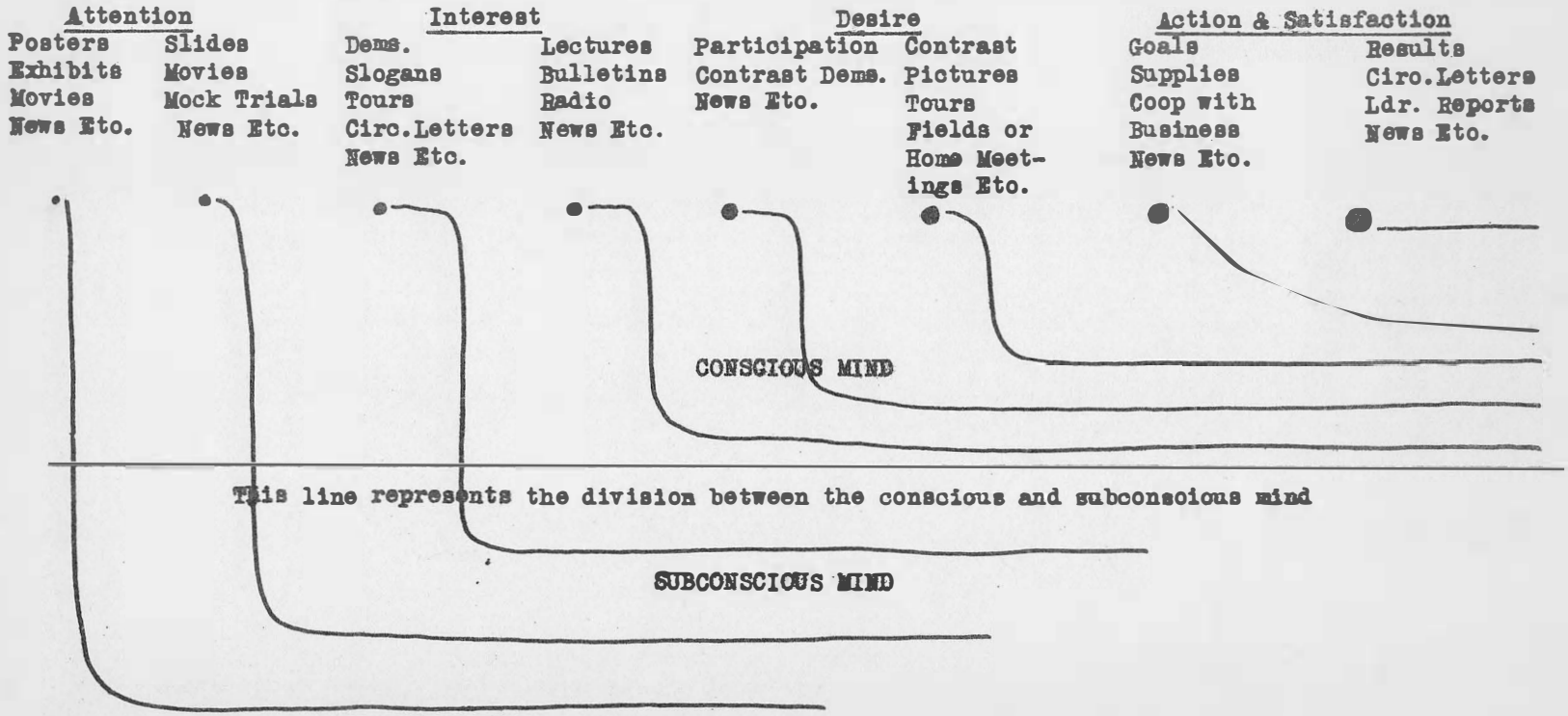
COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

U. S. Department of Agriculture
and State Agricultural Colleges
Cooperating

Extension Service, Office of
Cooperative Extension Work
Washington, D. C.

A Diagramatic Scheme of the Use of Means and Agencies to Secure Attention, Develop Interest, and Lead to Action

A. B. Graham



AN INTERESTING DISEASE OF DOUGLAS FIR

By Nathaniel O. Howard

While scouting for larch canker in Rhode Island during the early fall of 1927, the author discovered an interesting disease of Douglas fir. The affected trees are located on what was formerly the Russell Estate, Potowomut Neck, town of Warwick, R. I. It is now known as the Goddard Memorial Park and constitutes a valuable link in the Metropolitan Park System. Thousands of Douglas firs have been planted at various times upon this estate. Many of these trees, due to unfavorable meteorological conditions, have died, yet hundreds from two and one-half to ten inches or more in diameter, still survive. It has been stated that the original shipment of Douglas firs to this estate was the first to be sent to this part of the country. Apparently they were all of the Central Rocky Mountain variety and were grown from seed collected in Colorado.

While the general appearance of the diseased firs at Potowomut Neck resembles somewhat those observed at Ipswich and Hamilton, Mass., growing near cankered European larch, the abnormal symptoms here noted are much more pronounced. This, of course, may be due to the fact that the Rhode Island trees are older and larger.

Among the more conspicuous symptoms of disease noted are the following:- an unhealthy, gouty appearance of the main trunk; an abundance of resin sometimes covering a considerable portion of the lower ten to fifteen feet of the trunk, occasionally extending outward upon the ground for a distance of a foot or more from the base of the tree and often hanging in drops from the inner parts of the lower branches; swellings or hypertrophies often occurring in series and noticeable upon the trunk and branches. A close examination of the hypertrophies reveals the presence of numerous tiny cup-shaped fungous fruiting bodies, white to light grey without, orange within. In the orange lining are borne the spores of the fungus. It is interesting to note that the organism is a species of Dasyscypha closely related to Dasyscypha willkommii, the cause of the European larch canker. Whether the affected Douglas firs are diseased as a result of the activities of the fungus or whether the effects of unfavorable environmental, meteorological or climatic factors are involved remains for further investigation to determine. If, as in the case of the Larch canker, the disease proves to be highly contagious it at once becomes a serious menace to one of our most important sources of timber - the Douglas Fir of the West.

RIBES RESEEDING IN OLD-FIELD TYPES

E. W. Littlefield

These remarks refer to some observations carried on for the past 4 years in New York, on old-field areas where large gooseberries have been eradicated. When bushes are pulled under such conditions it seems to be the general rule that large numbers of Ribes seedlings germinate in and around the place where the ground has been disturbed. The bulk of the germination takes place in the spring following eradication, but there continues to be some germination for at least three years. Mortality is of course high, particularly the first season, but in those plots which have been followed since 1925, there are still enough seedlings remaining to repopulate the area. The results on 64 such plots, or spots, are given here. These plots are irregular in shape, and from one to three feet on a side, surrounding the hole made by pulling the original bush. Seedling counts taken in 1925 (the year following eradication) and in each succeeding year, indicate the general progress of reseeding as follows:

	Survived from previous year	Current Year's germination	Total Seedlings
1925	-	1261[o]	1261
1926	743	207	950
1927	570	14	584
1928	534	12	546

[o] Probably includes some 1924 germination.

The 546 Ribes seedlings now remaining represent an average of 9 per spot, based on the original bushes, or 11 per spot based on the 50 spots in which seedlings are still present. The number which germinated ranged from one to over 200 per spot; as a rule, spots with 10 or more seedlings to start with still have some left.

Several more years observation will be necessary to show whether the surviving seedlings will overcome the competition of other plants and develop into bushes large enough to be a menace from the standpoint of Blister Rust Control.

Littlefield: Apparently most of the germination takes place in the first two years after eradication.

Fivaz: The number of seedlings coming back as shown by Littlefield seems a little bit too high on the basis of Fivaz's plots.

Littlefield: Disagrees with Fivaz - four years observations made to obtain data given - 2,000 other seedlings under observation

show same trend.

York: About a year ago went to an old buckwheat field, which was about four years old - filled a large sugar bag full of remains of old buckwheat and spread it around fifteen foot hedge of barberry bushes at his home; also put some around a vine in another part of the yard. This year, found seven Ribes seedlings around the barberry bushes and two around the vine.

THE BLISTER RUST CONTROL PROBLEM IN THE EASTERN UNITED STATES

By J. F. Martin

Northern white pine is one of our best forest tree species in the eastern United States and forms an important part of our timber resources. As such, it affects the present and future welfare of the American people and protecting it from destruction by the white pine blister rust is an economic necessity. The safety of this crop depends upon the continuous and systematic suppression of Ribes.

From time to time, different field men have asked me what was going to happen to blister rust control work at the end of the so-called eight-year control program. Since, as the old saying goes, "Nothing is certain in this life, but death and taxes," I have had to answer this question in general terms based upon the work which needs to be done to effectively control this disease over extensive forest areas. Most of those present at this conference are familiar with the history of blister rust control work in the eastern United States, particularly in New England and New York. However, a brief review of the milestones in the development of this work may help both to clarify and unify our perspectives.

Blister rust was first discovered in the eastern United States in 1906 on cultivated black currants. From then until 1915, attempts were made to eradicate the disease by tracing shipments of imported nursery stock and destroying infected host plants. The first milestone was passed in 1916 when surveys showed that the disease was well established in our native white pine forests, making further attempts to eradicate it a waste of effort.

At that time, little was known about the control of blister rust other than the fact that it lived alternately upon two host plants, the white pines and Ribes. At a conference of foresters, pathologists, State officials, and others interested in the control of the disease, it was decided to undertake experimentally, the eradication of Ribes in and around pine stands, to determine whether it was practicable to control the rust by the separation of its host plants. In this work we were pioneering in a new field in the control of forest tree diseases, and consequently had to feel our way along in developing control measures. Side by side with the experimental development of methods for eradicating Ribes, it was necessary to conduct extensive investigations of the causal fungus to determine unknown points in its life-history, such as the distance the spores would spread between host plants, which were of basic importance in control work. This experimental and investigational work was carried on in cooperation with the Northeastern States from 1917 to 1921 inclusive. During this time, the investigative work showed that the infecting range of spores from Ribes to pines under eastern forest conditions was usually less than 900 feet. The experimental eradication of Ribes

on 1,036,903 acres of land developed efficient methods of finding and removing these plants at a reasonable cost. Also, it demonstrated that their removal within 900 feet of white pine gave effective local control of the disease. This successful development of local control measures marks the passing of the second milestone in blister rust control work.

Meanwhile, the disease had spread rapidly and was causing severe damage to the native white pine forests of the Northeastern States. The situation was so serious that in 1922 that the affected States and the U. S. Department of Agriculture undertook a joint, emergency control program to secure the general and systematic application of local control measures on white pine areas. This program was designed to bring the disease under control and protect the existing and potential white pine timber in our eastern forests.

In formulating the program, the question arose as to how long it would take to establish control on white pine areas in the Northeastern States. This was approximated by dividing the average number of farmers per county by the average number of visits per year made by the county agricultural agents. The result showed eight years as the minimum time required to secure the cooperation of pine owners in protecting their holdings in the Northeastern States, and the control program became known as the "Eight-Year Program." This time-estimate although rough, has been useful in that it gave a definite objective toward which to work in establishing control of the disease on the white pine areas of this region. The cooperative control work has made excellent progress, and the cooperation of the pine owners and others interested in the preservation of the white pine in the Northeastern States has been especially outstanding and helpful in the control of this disease. Strong leadership within the States and whole-hearted cooperation all along the line are responsible for the rapid progress which has been made in establishing control of the disease and is our assurance that it will be maintained. Under the present program, we still have a year and a half - or approximately two more seasons in which to complete the initial eradication of Ribes in New England and New York.

A survey of the forests of New England and New York shows that they contain about 8,221,167 acres of white pine of sufficient value to justify protection. Control of the rust has been established on 6,832,498 acres of land by the initial eradication of Ribes. This acreage includes the protective zones and 350,407 acres of reeradication work. This leaves 1,739,076 acres of white pine, plus the protective zones, which are still in need of initial eradication of Ribes. During the next two years, we should make an intensive effort to secure the application of control measures an the remaining unprotected white pine areas in New England and New York. The completion of this work will mark the passing of the third milestone in the control of white-pine blister rust in this region.

The next step which must be considered in New England and New York is how to maintain control of the disease on the white pine areas which have been protected. The answer to this problem, in my opinion, answers the question which the field men have asked from time to time, as to what would happen in the control of white pine blister rust, following the eight-year program. This question must be answered not only for the Northeastern States, but also for the Appalachian and Lake States. In 1922, the Appalachian and Lake States regions were only slightly infected; but since then the disease has spread more rapidly and is now established over extensive areas. Within the next two years, therefore, we will have reached a point in the control of blister rust in the eastern United States where it becomes necessary to readjust our work to meet a new situation not only in New England and New York, but also in the Appalachian and Lake States.

In accomplishing control of white pine blister rust, the work passes through three distinct stages. These three stages are: first, the application of control measures to delay the natural spread of the disease and the making of preliminary surveys to determine blister rust conditions as a basis for the eradication of Ribes; second, the general and systematic application of control measures; and third, the maintenance of control. Blister rust work in the Appalachian States is in the first stage of control; in the Lake States it is nearing the second stage; and in the Northeastern States it is in the process of transition from the second to the third stage. The gradual spread and intensification of the rust has brought about conditions whereby all three stages of control work must be carried on simultaneously in different regions of the eastern white pine belt. While control work in the Appalachian and Lake States will probably develop about the same as in New England and New York, the latter States will soon be confronted with a new phase of the problem - the maintenance of control. In order to maintain control of the rust, it will be necessary to practice systematic suppression of Ribes on protected areas and this phase of the control problem is fully as important, and in some respects more so, than the original Ribes eradication.

It is obvious that blister rust will always be with us; and in order to keep it under control, it is necessary to keep Ribes out of white pine areas. Control work has been carried on by different methods in the different States. Some States have worked largely on the basis of town appropriations; others have used trained foremen working with pine owners; and in Rhode Island, special conditions have caused the State to do the necessary control work. Regardless of the methods used, competent trained men will have to periodically reexamine the white pine areas which have been protected in order to determine when re-eradication is necessary, and how it can be done most effectively and cheaply. Control work is not simple. So many factors enter into the control problem that expert knowledge of forestry, of the disease, of Ribes, and of control practices is necessary to do effective work. The average pine owner is untrained and unable to handle the problem without assistance. An efficiently trained

organization is required to systematically reinspect pine areas, and when necessary, to secure the cooperation of the owners in re-eradicating the Ribes. Such an organization will be necessary to keep this disease under control until the pine owners gradually develop into wide-awake foresters, with the habit of control of blister rust so fully formed that a large percentage of them will do their work without being coaxed and persuaded. When such a time arrives, blister rust will be taken care of automatically, as is the case with many pests of important agricultural crops. However, agriculture in this country is at least 300 years old, whereas forestry practice is still in its infancy. Meanwhile, some patience and continued persistent effort is needed to successfully maintain white pine in our forests, and educate the pine owners to form the habit of applying control measures.

Last year, at a meeting of the State cooperators in the Northeastern States, tentative plans were formulated for meeting the blister rust situation in this region. These plans contemplate an adjustment of the work effective July 1, 1930, which will retain our present organization and cooperative relationships, with such modifications as can be made in each State to reduce the cost without impairing the effectiveness of the control work. At the same time, provisions will be made for adjusting cooperative control work in the Appalachian and Lake States to adequately meet the conditions which are developing in those regions.

From this brief discussion of the control problem in the eastern United States, it is evident that our work is by no means completed. In fact, in New England and New York we are approaching the most critical period in the control of the disease, and unless we can successfully maintain control on areas which have been protected, the tremendous efforts which has been put forth to save the white pine will be largely wasted. Control maps of the different white pine districts with their eradication records will provide you with the basic data needed for systematically maintaining control of the rust. The adequacy of these records and the efficiency with which you apply them, will be largely instrumental in reducing the cost of the work and in assuring its efficiency and effectiveness. The problem of maintaining control of the disease is a challenge to you men, which will demand your best thought and persistent efforts to successfully accomplish.

HISTORY OF GODDARD MEMORIAL PARK

By T. G. Mathewson

It has always been a pleasure to me to welcome visitors to this estate and I am especially glad that you, who are interested in just the sort of work that this place exemplifies, are here to see it.

Most of you know just where you are, that Goddard Park is in the town of Warwick or that detached portion of Warwick known as Potowomut Neck lying across the cove from East Greenwich.

For one hundred and thirty-five years previous to the twenty-ninth of last November this section was owned by one family as their summer home. To those of us who have grown old with the traditions of Potowomut it seems most fitting that it should continue as a summer recreation ground for all who care to enjoy its privileges.

When, a year ago, Mr. Robert Hale Ives Goddard and his sister Madame Madeleine d'Andigne deeded to the State of Rhode Island these 450 or more acres to be used as a park and known as Goddard Memorial Park in memory of their father, Col. R. H. I. Goddard, they insured the continuation of this property as a perpetual pleasure spot and such it has been to a great extent throughout the ages, even when the Red men possessed it in undisputed ownership before the coming of our forefathers.

Potowomut is an Indian name signifying "Land of Fires" -- Campfires. Around the campfires glowing up and down the length of this peninsula the old chiefs repeated the legends of their race and thus their traditions were passed from one generation to another. There is no doubt that Roger Williams was their guest, living, as he has written, in their smoky tents and learning their language and customs.

The Narragansett Indians were noted for their skill in shell work. Their money called wampum or wampum-peage was made from the shell of the round clam, the quahaug. With the coming of the white man the demand for this money increased and the abundance of shell fish along the shores in this vicinity made this the natural mint for the Red men from far inland. There are mounds not far away which contain such large amounts of shell as to support this theory or tradition.

Not only were the shells of the clams used, but also the clams inside were strung on sinews, hung over the fire where they were dried and smoked for winter use; reeds and slender trees were plentiful for their basket making. All along the short of Narragansett Bay the land was noted for its fertility. The few oaks that remain show evidence of its having been somewhat wooded, yet we are told that here were the favorite cornlands where the Indians made summer encampments while caring for their

crops. It is not for us to attempt too close inquiry into the association of the Indians and this piece of land, but it is a fact attested by the deed on record in the Warwick Town Hall that only after all the surrounding land had been surrendered to the white men did they relinquish this, their beloved land of camp fires.

It was in the year 1654 that Ta-comman-an and his two sons deeded to the inhabitants of Warwick "the meadows and mowable lands of Potowomut." These lands were soon divided into 36 shares among 19 freemen of Warwick. The greater number of these shares were bought up by members of the Greene family, long noted in Rhode Island history. The branch of which Gen. Nathanael Greene was a member, acquired the southern part, and the branch of which John Paul Greene was the latest here, owned the northwestern part (that section including the Rocks and Thorncliff.) The section opposite Pojack Point lying along the Potowomut or Greene's River at the time of the Revolutionary War was the property of Richard Greene.

Since it was at this point that the family of Col. Goddard was first associated with Potowomut it may be of interest to recount some of the incidents connected with that association.

Richard Greene was at that time considered a wealthy land-owner. It is supposed that he built the first house on the Neck, the original part of the house once the estate of Moses Goddard, now Mrs. Shaw's. At that place he entertained with lavish hospitality and in such a grand manner that he was known as 'King Richard.' Hunting parties with flashing red coats were often seen. Many noted people not only from this colony but from Massachusetts and much greater distances were among his guests. The four Brown Brothers, merchants of Providence were often visitors here and at such times as 'King Richard' overreached his resources they helped him in money matters.

When the Revolution came Richard Greene's sympathies were with the British; he welcomed the officers of the fleet at his home and his flocks and herds were welcomed as food on board the ships in the Bay. This behavior on his part was censured by his patriotic relatives and neighbors. At length he went to Newport where the British occupied the city and while there his death occurred.

After the close of the war his property was sold at auction, the Brown Brothers of Providence becoming the next owners.

In the counting house of the Browns was a young man from Beverly, Massachusetts, Thomas Poynton Ives. The story is told that when Nicholas Brown, one of the brothers, discovered that his daughter Pope seemed to have an interest in this young man, he objected. She inquired his objection, to which he made answer that he wished her to marry a gentleman. What, she asked, were his requirements for a gentleman. "Money, wit and

manners,' was his reply. This she promptly met with, "That is easily settled. I have the money and Ives has the wit and manners."

Her argument must have proved conclusive for in March 1792 Hope Brown became Mrs. Thomas P. Ives and the Potowomut lands were given to her as a wedding gift. Thus 136 years ago Potowomut became the summer home and recreation ground of the Brown and Ives family of Providence. Such pieces of land as were not in the wedding gift were purchased from time to time until 1862 when the purchase of the John Paul Greene holdings (the present Thorncliff and the lands to the Rocks) completed their ownership of the entire northern end of Potowomut.

Upon the death of Hope Brown Ives, Madam Ives, as she was called by her family and associated, her property was bequeathed to her three children. The northern section to her daughter Charlotte who had married Professor Goddard of Brown University. It might be mentioned here that it was Madam Ives' brother, Nicholas Brown, for whom Brown University was named because of his gifts to that institution and one of the buildings, Hope College, was also named in her honor.

The section willed to Mrs. Goddard which adjoins the park was later divided among her sons and daughters who erected summer residences there. The southeastern section was given to Madam Ives' son Robert, whose daughter married Professor Gammell and their children still own the land across the highway from Goddard Park. The section now in Goddard Park was given by Madam Ives to Moses Ives. Moses Ives survived his mother by only two years and at the death it became the property of his two children, Thomas P. and Hope Brown Ives, 2nd.

Mr. Thomas Ives was greatly interested in this estate and in 1858 built for his own residence the house still standing and known as the Farm House. Mr. Ives set out many of the elm trees and caused to be planted the maples and elms on both sides of the highway as well as the hemlocks and a few other trees inside the wall. As a result of illness contracted during his service as Captain during the Civil War and one month after his marriage at Vienna, Austria, to Elizabeth Cabot Motley, daughter of John Lothrop Motley, the historian, and while returning to America, Captain Thomas Ives died August 1865. His property then became that of his mother and sister.

His sister, Hope Ives, had married a short time previous to this Captain Ives' friend Henry Grinnell Russell, a native of New Bedford, Mass. It is due to Mr. Russell perhaps more than to anyone else, that we are able to speak with pride of the scenery of Goddard Park.

If you will pardon personal references, I would like to explain at this point, a coincidence of associations which have extended over a

period of nearly eighty years of the development of this property. In 1849, seven years before the death of Hope Brown Ives, to whom this place was given as a wedding gift, she employed as her superintendent or as she would have said, her farmer, Joseph W. Madison, my wife's father. He continued on this estate until his death, in 1900, a service of 51 years. His two children were born here over seventy years ago. My brother-in-law, Geo. W. Madison, first with his father, then as manager of the farm, was associated with Captain Ives and with Mr. and Mrs. Russell during the earliest experiments with trees. After Mrs. Russell's death he retired to his own farm in North Kingstown. Mr. Madison is here today and will be glad to explain some of the earlier experiences in tree planting, during the hike through the forest.

It is very difficult to imagine in these surroundings, a long stretch of barren fields and pasture, a few old oaks through this section with some few junipers and scrub growth along the shore. The prevailing winds from the west had swept across the cove and lifted the topsoil, of no great depth at best, and were fast making sand dunes where fields had been. Such was the condition Mr. and Mrs. Russell saw when in about 1870 they looked upon this end of the farm with view to building a summer residence here.

The idea of planting trees occurred to Mr. Russell. This idea he at once tried to carry out. His first attempt was with European larches; these he planted along the bank of the cove. That they did not prove a success was due largely to soil condition. He next turned his attention to seed planting. He prepared a field as for corn and planted pine tree seeds in squares. These seeds came up and the seedlings were kept free from weeds. The hot sun of July and August burned the greater number of them. The few that lived were transplanted to other locations. In spite of discouragement, Mr. Russell sought other methods to solve his problem.

Professor Sargent of Harvard or Arnold Arboretum, a cousin of Mrs. Russell, was much interested in Mr. Russell's experiments and while poking considerable friendly fun at his efforts suggested that his forest might succeed if the seeds were planted in flats or screened beds. This method was tried and proved most satisfactory and to such an extent that nearly all the larches, pines and spruces that are now seen along the shore of the cove had their beginning as seeds in small flats in the Nursery.

When the tree seedlings were four years old they were planted out in various soils and shaded with cut brush. The first planting was made in 1873, fifty-five years ago. The trees seen from the mansion house are of that planting. Mr. Russell always planted trees in rows. These were later thinned out and trimmed making very pleasing groves.

It was a great satisfaction to Mr. Russell that his experiment was a success and that the fields were saved from the menace of sand

which had threatened them, while the trees themselves were a pleasure of which he never tired. That his efforts should result in the reforestation of sandy areas the entire length of the Atlantic Coast he did not live to realize.

When in the spring of 1890 I entered into active participation in the work here my first duty was to direct the planting out of two large tracts of pine. These tracts showing now forty years growth we shall visit this afternoon. It was soon after this that Mr. Russell felt that he had covered sufficient territory with trees and turned his attention to thinning out and trimming up the evergreens. He also began the planting of hard woods. It was his custom to fill his pockets with acorns and as he walked through the groves of pine or else where he made holes with his cane, into which he dropped the acorn. He reckoned that he ought to get at least one oak tree for every three acorns that he planted for he reasoned that one acorn the squirrels would find, the worms destroy the second and the third would grow into his tree. Thus originated his saying that he planted three acorns for a tree, one for the squirrels, one for the worms and one to grow. In a few places he found this method too slow and had the acorns gathered, old broom handles sharpened to points and a squad of men to accompany him in planting the oaks.

After his death in 1904, Mrs. Russell took very little interest in affairs except that everything should be continued as he would have wished, and at her death five years later in June 1909, gave her estate to her cousin Col. R. H. I. Goddard.

Mr. Goddard realizing that it would be unwise to keep the farm under cultivation, yet not wishing to see it return to an unguided wild condition, turned his attention to further forestation and during the years 1910 to 1913 caused many thousands of soft woods to be planted in the less desirable fields. Mr. Goddard also attempted a hardwood arboretum in which many fine specimens were planted. Due to poor location and other circumstances this arboretum has not survived, I regret to say, but I hope it may be renewed in another part of the Park.

It is a satisfaction to add that while Mr. and Mrs. Russell were pioneering in the planting of pines and spruces to save their land from sand, they were also importing many specimens of trees not native to this section both from foreign countries and from other parts of the United States. These specimens may be seen on the lawns.

Some years before his death Mr. Russell opened up a drive through his plantation following the shore above the bank. This drive in days when the automobile has made driving on the public highways a precarious pleasure will prove a boon to those desiring carriage drives and with the adjoining trails through the forest provides nearly five miles of bridle paths. The donors Madame d'Andigne and Mr. Goddard have provided

for the exclusion of the automobile from these drives and trails by making it one of the conditions of their gift to the State, that automobiles are to be barred from the forest areas except for direct roads leading to the shore.

It is with reasonable pride that we review the past of this estate and with equal pride that we look forward to the future of Goddard Park under the management of the Rhode Island Metropolitan Park Commission. The people of this State at our recent election have empowered the Commission to use over a period of years a bond issue of $600,000 part of which is to be expended here.

We are assured that the Creator who has so wisely guided those who have striven in the past to make this a place of beauty and enjoyment will continue to direct the future of Goddard Park.

POEMS ON GODDARD MEMORIAL PARK

THE FOREST AT "THE OAKS."

Written 1902 by Mrs. Thomas G. Mathewson

I sing today of a forest,
Of trees a wonderful harvest,
As they grow along the water-side
They bow and sway to the ebbing tide.

Not seamed and gnarled and old,
But full of life and bold,
And many without a mar,
The trees of this forest are.

Some six and twenty years ago
This infant wood began to grow,
Conceived in the mind of a man
Who as forester stands in the van.

Pine and spruce trees up into thousands
Were planted here upon these lowlands;
From the Waukegan Nurseries of the West
Came the nucleus of this rare forest.

Red pines from the dense woods of Minnesota
Have also furnished a fair quota,
But when transplanted to this clime
Many have lived but a short time.

Baby trees - they missed their mother earth,
What wonder they pined for dearth
Of home life, and the protecting shade
Of those old forests so deeply laid.

But the pretty catalpa and maple too
Found scattered along this woodland through,
Take more kindly to the sandy soil
And have well rewarded the planter's toil.

There are tamaracks growing here
From only the size of a boutonniere
To trees that now when cut and sawed
Turn out many a good sized board.

Ailanthus! "Chinese tree of Heaven,"
To you a special task was given
And in this forest you were placed
Not only to keep the land from waste

But to other trees a protection be
By forming for them a shade and lea
So larch and pine tree may extend
Their hearty thanks and call you friend.

Cedars sprinkled at its very feet
Help to make the forest complete,
Running way down to the waters edge
They seem like a fringe on the sandy ridge.

Beautiful drives and paths abound
And many a heart in this wood has found
Rest from the care and worries of life
In leaving awhile its toil and strife.

For he whose ever outstretched hand
Is ready to help his brother man,
Leaves open wide the outer gate
So all who will, see this fine estate.

With a thought for the future far away
When the short-lived trees must all decay,
Many acorns have been planted here
And good sized oaks already appear.

Sturdy and staunch they stand today
And it seems we can almost hear them say
"The Oaks" it has been in the years gone by,
"The Oaks" it shall be until we die.

The adding of life to these homelands
Has made work for the mind as well as the hands
And on him who still toils in his labor of love
May rich benedictions fall from above.

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"THE OAKS" NOW GODDARD PARK

Written Nov. 1928 by Anna M. M. Lawrence.

The oaks remain though the years have passed
Gathering the souls while the memories last;
The master taken, the mistress yearned
To be with him, since he might not return.

Another came with silvery hair,
A gentleman beyond compare,
And countless trees he planted here
To cover fields so lone and drear.

Then, he, too, from earth was called away,
Leaving none, who cared to stay
And use the home as in other days,
For duties called them to different ways.

Almost deserted, yet guarded well
From careless throng or rude vandal,
The oaks grew on with their companion trees
Diffusing their fragrance on the breeze.

Thus, "The Oaks" passed its half-century mark,
Then no longer the Oaks - 'twas Goddard Park,
Once more the gate is opened wide,
Again there are visitors from far and wide.

Tho' no longer a private domain,
Ye oaks, forever, may ye remain
And may countless blessings be spread around
On weary souls from city and town.

Oh, State of Rhode Island and Providence Plantations, Hark -
To the plea that comes from Goddard Park!
Preserve its beauty from reckless hand
A sanctuary of Peace for bird and man.

RIBES RE-ERADICATION

By L. E. Newman

As I look back over the early days of white-pine blister rust control I do not recall that much thought, if any, was given the problem of Ribes re-eradication. Perhaps this was only natural, since in those days we were all absorbed in determining the distribution of pine infection; what constituted the best methods in the initial removal of wild Ribes, and in formulating an educational campaign. With the destruction of Ribes over several million acres confronting us, one could hardly censor our failure to consider the matter of reworking areas upon which not even the initial control had been put into effect.

As most of the States represented here today conduct their eradication program along lines which differ from each other, I shall not attempt to discuss re-eradication except from the New Hampshire angle. I know little of the situation in your respective States; I am not familiar with the attitude of your people towards re-eradication. However, I do know this: Had we in New Hampshire but appreciated that so much re-eradication was to be thrust upon us before the completion of the initial program, I am quite certain our field work, records, etc., would have been modeled along different lines than was the case. Likely enough, this same statement may be true for other States.

In addition to those States which took up blister-rust control in 1917, there are today quite a few recruits; States which have only commenced, or who are considering control measures for the protection of their white pine. It is to such States that these remarks are chiefly directed, inasmuch as it is my hope they may profit through New Hampshire's mistakes. I shall attempt to offer some suggestions as to how initial control might well be conducted, with the idea always in mind that these same areas four, six, or ten years hence must be reexamined, and the Ribes that have developed be removed.

Advance Ribes scouting is most essential when one considers re-eradication. It promises some very desirable results, (1) less expensive initial control, (2) more likely action from towns or individuals in re-eradication, and (3) less area to cover the second time over, which naturally demands a smaller expenditure.

Along with advanced Ribes scouting, a map of the region covered will be found desirable. This should indicate (1) areas containing few or no Ribes, and (2) those where crew work is necessary. It is also well to plot thereon all pine infections located. A map of this sort will prove of great educational value, and is of considerable worth to both agent and inspectors in checking crew or scout work.

When the time for re-eradication arrives it will be evident, for the most part, that only such blocks or subdivisions where crew work was first needed are all that will require attention in the second examination. However, for safety's sake the scout should make a general check through areas previously eliminated from crew work in order to determine whether any concentration of Ribes were missed. Owing to the marked occurrence of Ribes along fences and stonewalls, rock piles and cellar holes, it is felt highly essential to examine such places the second time over.

Where any crew work is necessary the same methods should be used in re-eradication as were employed in initial control; the size of the crew varying with the abundance of Ribes and extent of area to be worked.

Roadsides, owing to their peculiar character are more effectively and economically covered by the crew. It is, therefore, recommended that in re-eradication such areas be reexamined by a crew, the size of which will be determined by conditions. Some may question the necessity of reworking the strip along highways, but it should be mentioned that in New Hampshire, at least, town road-agents annually mow the highways, cutting off the crowns of Ribes.

There is another method which I strongly feel should be practiced even before advanced Ribes scouting is commenced. It is a practice that New Hampshire has adopted only this fall, although it may be that other States have been employing this scheme for some time.

I have in mind the examination of large areas for the purpose of determining whether or not the region designed to be put under control contains sufficient pine to warrant an expenditure of funds. In New Hampshire we have about 25 towns which have never carried on control measures, in spite of the fact that much educational work has been conducted in them. There is also another group totaling 24 that have appropriated but one year. These communities are what we term our "backward towns."

With the idea of stimulating interest which will result in such towns adopting a definite control program, we undertook this fall an examination of the woodlands of these communities. The agents were instructed that all areas should be eliminated from control work, unless they contained sufficient pine, regardless of its age, to warrant an expenditure of public monies. Naturally, in determining such areas an allowance was made for a protective strip. Hardwood areas, softwoods other than pine, and waste lands were excluded during this survey. Even such blocks as contained an excellent understory of white pine, but which, after an examination, did not appear likely to come through to maturity, were thrown out.

At the time of writing this paper the State leader has reports of nine (9) towns, and the result is extremely gratifying. As an example;

in one town where we felt two to three years would be required to complete the initial program, we found that but one year is necessary, and at a maximum expenditure of only about $350.00, town and State funds included. It is entirely possible that advance Ribes scouting may further reduce this cost.

I do not want to leave this subject without putting in a word in defense of former eradication policies, since I suspect that some of my audience may make a mental inquiry as to why we did not put this method into practice several years ago. In my opinion, there were two logical reasons; (1) lack of experience, and (2) belief that complete eradication was essential and desirable. So far as the second contention is concerned I am inclined to believe that "complete eradication" is a sound policy for more than one reason.

In the first place we are all aware that it is extremely difficult to acquaint everyone with the fact that Ribes were deliberately left in certain areas and why, and naturally, we dreaded the effect that their discovery, by uninformed persons, might have. Secondly, inasmuch as blister-rust control is a project looking towards the protection of pine for a long period of years, too drastic an elimination of prospective pine areas may result in much future loss. I can think of hundreds of areas of waste or poorly stocked lands that in 1917, 1918 and 1919 might have been excluded from eradication.

Today, those same areas are covered with a thrifty growth of white pines which are a delight to the eye, and which hold out a promise of much future revenue. While the restriction of control areas may be a desirable practice so far as the pocketbook of the present day taxpayer is concerned, who knows but what a too drastic an elimination may result in depleting the exchequer of those taxpayers and white-pine owners of tomorrow?

Prior to writing this paper I have been requested to express an opinion as to the attitude of New Hampshire towns and individuals toward re-eradication, and also the probable sentiment of the State legislature in continuing to make available State aid in re-eradication. I believe that the following constitutes a reasonable opinion as to how most of our towns feel regarding re-eradication.

Our first project in re-eradication was undertaken in 1924 in the town of Hampton; two other towns commenced a second examination in 1925; four in 1926; seven in 1927, and nine in 1928, making a total of 23 towns. Three of these communities have completed the second examination and several more are well along. The areas re-eradicated in these 23 towns total 237,632 acres. The cost has varied from 15 to 19 cents per acre under that of the initial work.

The legislature has consistently approved blister rust appropriations. About 262 towns, cities and unincorporated places make up the

State. There are 234 towns and cities containing sufficient pine to warrant control measures. In view of the fact that 187 or nearly 80 per cent have voted funds for control measures it must be evident to the legislature just what the sentiment of the towns must be. In view of the foregoing it does not appear that we are over-optimistic in expecting a continuance of the present program.

EPIDEMIOLOGY OF WHITE-PINE BLISTER RUST - 1928.

By L. H. Pennington

One year ago an important topic for discussion was the widely distributed infection upon Ribes in both the Lake States and in the Eastern States. This condition was apparently largely the result of meteorological conditions which were favorable first for the wide distribution of aeciospores and second for initial infection and intensification upon Ribes.

The frequency and abundance of the rust upon Ribes in some localities made it seem probable that the pines not far distant from them had already become infected and were producing aeciospores. This probability became a reality when infected pines were found in central and western Pennsylvania and in Michigan, far removed from any previously known centers of infection. Recently reports have come to us of heavy pine infection in the Georgian Bay region of Ontario.

During the past season those who have covered much of the field and have followed the News Letter and other reports have seen that the rust has been more abundant and more widely spread than it was last year. However, it does not seem to have been so abundant in the Lake States as it was in 1927. This may be the direct result of differences in the moisture conditions in these two sections of the country. In the summer of 1927 rainfall was more abundant than normal and well distributed through the summer in both the East and in the Lake States. In 1928 it was again above normal in the East and somewhat below normal in the Middle West.

It is becoming more apparent that pine infection has been increasing since 1920 with the greatest amount occurring in 1925. We are, therefore, anxious to know what is to be expected as the result of the wide-spread and abundant infection of Ribes in 1927 and 1928.

In this connection the cooperative experiment we began last year upon the Pack Demonstration Forest near Warrensburg already affords an indication of what may have occurred in thousands of other places. This experiment was planned to determine if possible just when and under what conditions infection occurs in pine. In April, 1927, a suitable place was selected. This was a broad open area of abandoned farm land, large enough to furnish ample room for planting pines in the center at a safe distance from all Ribes. A few wild and cultivated Ribes were found near the margin of this area. These were all removed. A few rooted Ribes nigrum plants were planted at the east side of the open space about twenty yards from a mixed woods of maple, birch, hemlock, and white pine. Twenty-five hundred healthy four-year old white pine transplants from the New York State College of Forestry nursery were carefully potted in six-inch paper pots and kept in reserve near an old barn at a safe distance from the plot of Ribes nigrum.

The R. nigrum bushes grew fairly well and had about 800 leaves. These leaves became infected naturally and by the first week in August 80% of them were rusted. At that time there were 780 leaves in all upon the plants. On the 13th of July the first telia began to appear. On the morning of the next day, the 14th, twenty of the potted pines were placed in two rows of ten each near the Ribes bushes. The following morning, the 15th, they were removed and another lot of twenty put in their places. The twenty trees after the twenty-four hour exposure to the rust upon the Ribes bushes were planted near the center of the selected area at a safe distance from all Ribes. (Each tree was left in its paper pot which was sunk in the earth so that the top of the pot was even with the ground.) The trees were planted in rows six feet each way and each lot of twenty marked by numbered and dated stakes. This was continued with twenty fresh trees each day from July 14 until September 30.

Continuous temperature and relative humidity records were made by two Friez hydrothermographs near the Ribes nigrum plot. Both instruments were protected by the usual wooden shelter; one placed in the open and the other under the shade of trees some twenty-five yards from the Ribes plot. The instruments were checked and regulated each week by the use of a sling psychrometer.

On September 14, 1928, characteristic yellow spots and occasional swellings in the bark of some of the trees indicated that they had become infected. Although it is not likely that all the separate infections were yet advanced enough to render them visible by a yellowing of the bark, enough were plainly visible to indicate the trend of infection in the season of 1927. In many of the trees there were so many yellow spots indicating separate infections that by next summer they will have coalesced making it impossible to determine how many infection spots there were. A careful examination was made and the yellow spots tabulated as indicated in the following Table I:

TABLE I.

Date of Exposure in 1927	Infections in Internodal Growth of 1926	Infections in Internodal Growth of 1927	Total No. of Infections	No. of Trees on which Infection was found
July 14-18	0	0	0	0
" 19	1	0	1	1
" 20-21	0	0	0	0
" 22	1	0	1	1
" 23-29	0	0	0	0
" 30	4	0	4	3
" 31	34	28	62	12
Aug. 1	3	0	3	1
" 2	0	0	0	0
" 3	1	0	1	1
" 4-8	0	0	0	0
" 9	1	0	1	1
" 10-12	0	0	0	0
" 13	1	0	1	1
" 14-17	0	0	0	0
" 18	1	0	1	1
" 19-22	0	0	0	0
" 23	2	0	2	1
" 24	0	0	0	0
" 25	9	0	9	5
" 26	2	0	2	2
" 27	148	21	169	19 (1
" 28	12	3	15	7 dead)
" 29	4	5	9	7
" 30	1	1	2	2
" 31	2	0	2	2
Sept. 1	3	0	3	2
" 2-7	0	0	0	0
" 8	1	0	1	1
" 9-15	0	0	0	0
" 16	0	1	1	1
" 17-30	0	0	0	0
Total	231	59	290	71

The table indicates nearly four times as many infections in the 1926 internodes as in the 1927 internodes. This difference is due to two reasons aside from a possibly greater susceptibility of the older needles: First, in many of the potted pines the 1927 needles did not grow to their full length, and therefore did not have so much surface exposed to sporidia. In the second place, the 1927 internodes were shorter, the fascicles of needles consequently closer together and when there may have been infection through needles of several fascicles the bark showed a continuous

yellow area in its entire upper part around several bases. These yellow areas were counted as one infection.

After all due allowance for error in the determination of infection spots and for possible chance infection, it is very evident that considerable infection did occur and that practically all of it was on two days, July 31st and August 27th. An examination of the relative humidity records for last season shows that July 31st and August 27th and 28th were the only days with more or less rain, and high humidity in the open during the entire day of 24 hours. There were other days with equal or greater rainfall and with high humidity for part of the day but on these little or no infection occurred.

A comparison of periods of rainfall and amounts of precipitation as published by the Weather Bureau indicates that conditions should have been equally favorable for infection in the rest of New York, New England, and Pennsylvania. In the Middle West there should have been at least one period favorable for infection. There seems therefore no reason to think that infection may not have occurred in thousands of places last year where infected Ribes happened to be in the vicinity of white pine.

The experiment on the Pack Forest has been continued through the summer of 1928. It is of course too early to determine whether infection occurred. The relative humidity records show that there were three periods, July 27th, August 6th and 7th, and September 3d, in which pine infection might have occurred. Although published meteorological records for the entire season of 1928 are not yet available, the indications are that throughout the eastern section conditions for infection were fully as favorable in 1928 as they were in 1927.

Prophecy may fail; it is, however, very probable that in two or three years we shall look back upon 1927 and 1928 as two years in which unusually severe and wide-spread pine infection occurred. The damage and loss will be great but it will not reach the enormous proportions it would have reached had there been no systematic and thorough control practiced in the best pine-growing sections. The value of the protection already secured cannot be measured without taking into consideration the loss which would have resulted without this protection.

Question: Were records compared with old weather records?

Answer: Compared them with 1919 records which were very similar to 1927 -- 1919 was a peak year for infection.

Question: To what extent was humidity curve correlated with precipitation?

Answer: Follows very closely.

SUGGESTIONS ON EDUCATIONAL WORK

By Roy G. Pierce

Educational Work in the Schools

There is a growing desire on the part of high schools in the Northeastern and Lake States, especially in the biology and botany classes, for information concerning the blister rust. This interest has been manifested by numerous inquiries made direct to the Washington Office. Besides sending the teachers and the pupils the material they requested, consisting either of a bulletin or circular, or a colored blister-rust control poster, and perhaps some specimens of the blister rust on Ribes and pine, I have nearly always, in answering this correspondence, referred the teachers to the State Leader. This has been done so that the latter would know of the inquiry and the teacher would know where to get additional detailed information concerning the blister-rust control work carried on in their particular State.

State leaders might well consider the desirability of some additional work in all the high schools of their States. They could be sent the latest publications on the blister rust and its control. In addition, information on the kind of cooperation which the State offers pine owners, might well be included, together with the status of the control work in the State. In any statement such as this the value and importance of the northern white pine to the State should be emphasized. Since our aim is the destruction of the currants and gooseberries near the white pines, particular emphasis might be placed on identification of the various currants and gooseberry bushes rather than on the rust itself. Specimens, therefore, of each kind of currant and gooseberry might be collected by the teacher or by the pupils themselves.

In regions newly infected by the rust some assistance could be acturally rendered by the teacher and pupils in scouting for the rust if the work is properly planned and organized. The presence of rust in a locality could be reported by the pupils as well as the names of pine owners who might become possible cooperators in the State. I am sure Dr. McCubbin of Pennsylvania, and Messrs. Mandenberg and Stouffer of Michigan, feel well repaid for the time and money spent in the school survey carried on in their respective States. I do not feel, however, that we need to consider this educational work on the basis of getting back immediately the equivalent in value for that which was given. Our purpose is to devise ways and means of getting the white pines protected from the blister rust, and the education of all scholars of high school age year after year, will awaken their interest and later secure their cooperation when they are in a position to make plans and execute them. The fundamental needs of forest protection with due reference to that part blister-rust control plays in the protection of our white pines could well be presented to these pupils.

New Type of Specimens

It is well known that specimens of currant and gooseberry leaves infected with the blister rust fade after a short time and consequently fail to depict accurately the condition of the rust when it is fresh. At the suggestion of Dr. E. P. Meinecke of the Office of Forest Pathology we have decided to paint the blister rust on the leaves. While such specimens will not stand close scrutiny or the use of a hand lens their general appearance is very lifelike. Such specimens as these can be made up for the use of the field man.

Proposed New Leaflet

The Office is considering the mimeographing or printing of a small four-page leaflet for general distribution at fairs or other places where blister rust is exhibited. Mr. Perry made up a blue print which briefly tells what the blister rust is, how it spreads, and how it can be controlled, with a summary on the back. We would be glad to have your ideas for the improvement of this publication.

Proposed Poster

Mrs. Fivaz has produced a poster giving the essential facts concerning the disease and its control as it might be presented to school children. Several copies of this poster are here. It has not been printed and is presented to obtain your ideas on how and where it could be best used in connection with control work.

Educational Material Available

Graphic Charts

The Washington Office has on hand a number of sets of the four illustrations used by Mr. Detwiler in his Miscellaneous Publication No. 27, entitled "Black Currants Spread White-Pine Blister Rust." The illustrations are enlarged to 15-1/2 by 26-1/4 inches and are mounted on heavy cardboard. These will be sent to any of the agents applying for them.

Posters and Tags

There are still available between 400 and 800 posters of 4 different kinds. These posters are on stiff manilla cardboard, 22 by 28 inches in size and the letters are in black. The posters are (1) zLook Blister Rust Ahead; (2) Blister Rust Kills White Pine; (3) Blister Rust Can Be Controlled; and (4) Protect Your Pines from Blister Rust. Mr. Graham has already called attention to the fact that these are some of the best posters he has ever seen, for each of them has but few words; the letters are large, hence easily read from a fast-moving machine; and they give the message.

Your attention is called to the colored photographic enlargements which Mr. Stevens has used so successfully in his novel blister-rust panel on exhibit in this room. The Washington Office supplied these photographs and stands ready to make similar enlargements for use in other States.

A new use for the red tag, "This is a Blister Rust Canker," has been brought out by Maine. We have had multigraphed for the use of the Maine agents 7,000 tags with a history of the disease printed on the reverse side. This history is split by the single line, "This is a Blister Rust Canker," and though necessarily of small type is easily read.

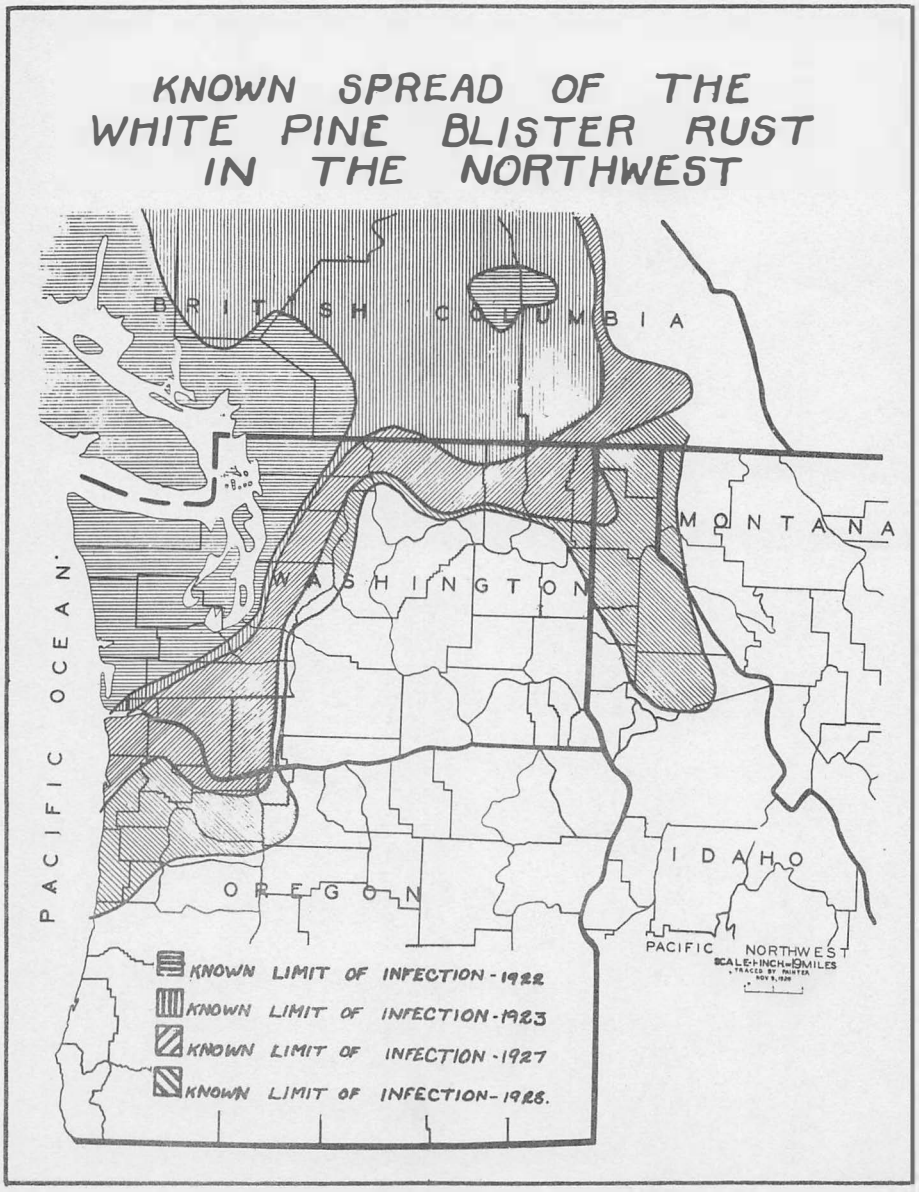
Question: Wouldn't it be a good idea for the State leaders to confer with Mr. Pierce with reference to educational features to be used in reaching cooperators and getting them to come around to our point of view?

Answer: We have been asking this for some time, and hope something will be done in this respect.

BLISTER RUST CONTROL IN THE WEST

By G. B. Posey

The blister rust was introduced in the West about 1910. Indications are that it became established from infected white pines which were imported from France and planted at Vancouver, British Columbia in 1910. It was first found there in 1921 and later during the same season it was also found at several widely separated points in western Washington. Scouting during following years showed the rust to have spread rapidly. Its spread towards the north was more rapid than towards the south. (See map below showing known distribution at different periods since 1921).



The blister rust control program for the West has comprised three general lines of work - scouting and delay measures, investigations, and local control.

Scouting and Delay: Systematic scouting has been carried on each year since the first discovery of the rust to determine its spread and intensification as a basis for timing other activities relative to control. Delay measures have consisted of strict enforcement of quarantines aimed at safeguarding against artificial spread of the disease from infected to uninfected areas and systematically eliminating the cultivated black currant (R. nigrum) from the five western States where susceptible pines are important forest trees. This work has been completed in Montana, Idaho and Oregon and is nearing completion in Washington and California.

Investigations: Investigations of the rust on its new host plants and under its new climates of the West were begun in 1922 and have been conducted to date. So far the following results have been obtained.

1. The rust appears to be adjusted to climatic conditions throughout its present range in the West and is rapidly increasing on pines wherever established.

2. The rate of damage to pine is governed by the species and abundance of Ribes present.

3. Western white pine is two or more times as susceptible as eastern white pine where both species are exposed under the same conditions. White-bark pine (P. albicaulis) growing with western white pine appears to be more susceptible than the latter.

4. The Ribes species of the chief western white pine area have a wide range of susceptibility to the rust.

The four important Ribes of this region take the following rank of susceptibility. 1st R. petiolare the wild black currant of the Inland western white pine belt. 2nd, G. inermis the only important gooseberry of the region (both of these species inhabit the stream type, a network of narrow belts of low ground separating the higher lands upon which the pines grow). 3rd, R. viscosisimum. This species is a temporary plant that comes in thickly on the pine sites following logging and burns, and is soon suppressed when the forest growth takes place. 4th R. lacustre. This species is ubiquitous - it is found in both the dry and wet sites and is more tolerant than any of the rest. It is the most difficult Ribes to conquer but fortunately it is very low in susceptibility. The basic cause of this difference in Ribes susceptibility is still a question. Perhaps the most promising explanation was brought to light recently by Mr. H. R. Offord of our western organization. He made chemical analysis of the leaves of these species and found their tannin content after the water had been withdrawn were as follows:

R. petiolare 4.9%; G. inermis 7.9%; R. viscosisimum 9.2%; and R. lacustre 11.2%

Thus it appears that the higher the tannin content the lower the susceptibility of the species to the rust. The first two of these species are apparently higher in susceptibility than any of the wild species of the East. R. petiolare ranks close to R. nigrum in production of sporidia. Thus it is presumed that the reaction of this species in causing pine damage will be similar to that of nigrum.

On the basis of great abundance and high susceptibility it is estimated that the stream type Ribes represent about 75% of the potential danger to the white pines. These species are confined to about 4% of the white-pine land area. The upland species are distributed over about 34% of the area but are low in susceptibility and are largely suppressed out after the forest growth becomes dense. These facts indicate that any attempt at local control should deal first with the systematic eradication of the stream type species.

6. Long distance spread of the rust from pines to Ribes has occurred in the West. Rather clear cut evidence is at hand showing a spread of 100 or more miles at a jump. Its long spread on Ribes north of the range of white pines leaves no doubt on this point.

7. Overwintering on Ribes if it occurs at all is not an important factor in the West.

Local Control and Approximate Cost.

The general need and extent of local control in the western white pine area has been determined by control reconnaissance. This consists of survey of the forests to determine the general forest types, the relative abundance of Ribes, and other factors influencing the practical application of control measures. Careful data is taken along strip lines to show the composition of the types and to locate the type lines. A map is made as the work progresses. In regions where the type lines are well defined and the types are of reasonably uniform composition large tracts are mapped in from vantage points thus greatly reducing the cost. Carefully worked out eradication cost figures obtained in experimental control work are applied to these data to give a workable estimate upon which to base our control program.

Reconnaissance as described above gives a good estimate of the job as a whole but does not furnish the detail necessary to apply control on a particular tract. This is obtained by what we call pre-eradication or intensive reconnaissance consisting of a careful survey dividing a given area into types according to working types. A map is made to scale showing the location and extent of each type as well as other important control information such as roads, trails, camp sites, etc.

Eradication is then applied according to the apparent needs of each particular block or type. The dense forest types are generally low in Ribes population and can be covered cheaply and effectively by wide-interval scouting to locate the openings where Ribes may exist. The more open stands with considerable brush can often be handled in the same way at a slightly higher cost. Close crew work is generally required for the reproduction stands, newly cut over areas, and comparatively newly burned areas. This is because the Ribes population within the timber sites reaches its height following light fires and logging. The so-called stream type requires the most intensive crew work. This type consists of a narrow network of streams spread over the forest as a whole. Conifers do not occur to any considerable extent in this type and it is permanently open thus affording excellent Ribes growth conditions at all times. In this type chemical eradication affects a large saving over hand eradication, but the use of chemicals so far is confined chiefly to the southern half of the inland commercial white-pine belt because here Ribes petiolare is the chief stream type species. This species is completely susceptible to sodium chlorate and is eradicated by a single application of the spray. Grossularia inermis and Ribes lacustre are the only species found in the stream type of the northern half of the region. A single application of chlorate on these species does not give a high enough kill to make chemical work fully effective. We are still hopeful of working out an efficient chemical for those species.

Eradication Efficiency, Western White Pine Area

Eradication efficiency records from 1922 to 1927 inclusive by years show on the basis of percentage of total plants 71% in 1922 and 86% in 1927 with an average of 81%. On a live-stem percentage basis it was 82% in 1922 and 96% in 1927 with an average of 90%.

Cost of Eradication Work in Western White Pine Area

The cost of eradication varies somewhat with the season with a general tendency towards slightly lower costs as a result of greater experience in later years. The cost is chiefly governed by the abundance of Ribes, which in turn, is governed by the Ribes growth and survival conditions. For example on the 1927 eradication areas:

Pole and mature timber types	contained	35	Ribes	per	acre
Reproduction stands	"	118	"	"	"
Cut over areas	"	338	"	"	"
Stream type	"	560	"	"	"
Swamp type	"	3,134	"	"	"

Average costs per acre from 1922 to 1927 are:
Stream type $11.46; reproduction $3.17; pole and mature $.85
All types $2.40. We spend between 3¢ and 4¢ per acre for checking.

Woods Organization

Our woods organization consists of camps of from 20 to 40 men, a camp boss, cook and flunky. Each camp functions independent of any other and is responsible to the eradication leader who has full authority over all. The efficiency checks are systematically made by a checking unit under the direction of the Eradication Leader. The rate of pay is about $2.70 per day and "keep" for crewmen, about $3.00 to $3.50 per day for foremen, about $150 per month for cooks, and $100 to $200 per month for camp bosses. Last year meals cost 39¢ each of which 25¢ was for food, 8¢ for cooking and 6¢ for trucking and packing.

Discussion

F. J. Baker briefly described similar spray work conducted in New Hampshire. Two areas were sprayed, but detailed data on live stem, etc. was not obtained as the skunk currants formed practically a solid ground cover. The bushes were sprayed in August, and about a week later Baker visited the areas to observe conditions. Practically all the leaves of the Ribes were dead and apparently a large percentage of the bushes had been killed. However, one week after the first check, Baker again visited the plots and noticed buds were developing from portions of the unkilled stems. The last time he made observations he estimated 75% of the bushes showed signs of life. At this time he did not think it fair to draw any definite conclusions.

E. W. Littlefield reported that their results in New York were practically the same as those obtained by the other speakers. Shortly after the work was completed it appeared that a complete kill had been obtained, But in checking over the area in September a new crop of leaves had developed which made the plot look similar to conditions in the spring when the Ribes leaves first appear.

G. B. Posey mentioned that in the West they had found the species of Ribes has a direct bearing on the percentage of kill obtained by the sprays. One application completely killed Ribes petiolare Dougl. but only about 10-30% of the live stem of other species was killed by the spraying. Experiments have shown that two or three applications will completely kill some species of gooseberries, but the practical value of the use of sprays under such conditions is questionable.

SYSTEMATIC CONTROL WORK

By J. E. Riley

I know that there is a workable system of control in all the cooperating States and so I express what views I have in all modesty and with no thought of dropping gems of wisdom. I have no pet scheme to champion and am forced to admit that there is very little that is original in my ideas or in the methods we are using in Connecticut. But perhaps a description of some of our methods will help to start the discussion - at least I can start the war and let the rest of you finish it.

Two things that we can all agree on regardless of our local conditions is that some system is necessary to effective control work and that a written statement is helpful in formulating a plan as well as in making it intelligible to others. I believe an elaborate or greatly detailed plan is unnecessary and is apt to represent wasted effort because the details and even methods used depend upon the amount of money and individual cooperation available. Both are subject to unexpected fluctuations governed by the degree of success attained in securing town and individual contributions, which in turn are governed by factors often beyond our control. I am not going to discuss further a written plan of work except to state the essentials of a working plan of blister rust control.

The essentials include:--

1. A statement covering the State policy regarding white pine and cultivated Ribes.

2. A statement of the control problem, including a definite objective or goal toward which to work.

3. A statement of economic and field conditions affecting the problem, including the amount and distribution of white pine and Ribes.

4. The establishment of a definite time limit for attaining the objective.

5. A scheme for working out the problem, describing the organization required, listing projects to be undertaken and outlining methods for carrying on the projects.

Such a plan will be supplemented from time to time by periodic plans embodying details of operation. The objectives of such periodic plans serve as the milestones in the progress toward the ultimate goal and measure seasonal accomplishments.

I am not going to describe our plan of work. All of us have the same general problem and objective. A discussion of our policies, field conditions and the present status of our control work would not interest you and would contribute little or nothing to the discussion. I expect all state plans include like projects, although their relative importance may differ. I am going to take one or two of our projects and discuss the methods used in promoting them.

Elimination of Non-Pine Area:

This project helps to fill two great needs in our plan of work; namely, the need of accurate information on the location and conditions of pine areas and the need of profitably employing the agents and scouts full time during the winter months. Connecticut has a pine survey made some years ago, but lumbering and other changes in forest conditions have made it unreliable as a basis for systematic control work.

Agents and state employees who are held over during the winter months devote their time to the elimination of non-pine areas when not engaged in educational or service work. The method employed in this type of scouting is as follows:

There are base maps consisting of photographic enlargements of the U. S. Geologic Survey sheets brought up to a scale of two inches to a mile. These maps may be obtained from the Washington office. Maps for field use are made from these maps by tracing roads, streams, town boundaries, etc., or else portions of the base map itself are used in the field. The latter has the advantage of showing contour lines and more detail, but has the disadvantages of being somewhat indistinct and of not permitting field notations to show up distinctly.

Upon this field map the scout indicates pine areas. He may use an auto to advantage in scouting from roads, when roads and weather conditions permit, but ordinarily the scouting is done on foot, except for transportation from block to block or from headquarters to the job and return. Areas that cannot be seen from roads must be mapped from elevations. Each type should be examined close enough to ascertain reproduction conditions because a good pine reproduction might throw an area into a pine type when a casual examination only from a distance would designate it as hardwood. A good deal of territory can be covered per day in this type of scouting. At night or when weather conditions prevent outside work, the data from the field map is transferred to a control data map.

RIBES SCOUTING AND MAP RECORDS.

The Control Data Map Sheet, an enlargement of which is shown, is a letter size sheet of tough, transparent paper containing a printed

title at the top, and at the bottom a printed legend, the purpose of which is to insure uniformity in recording data. The transparency of the paper permits tracing from the base map, the scale of which is large enough to allow for recording of scout and eradication data. The Control Data Map Sheet has room enough for two or more blocks. Our blocks are arbitrary units bounded by roads and streams. Scouting and eradication data are reported by blocks.

On this Control Data Map all non-pine areas eliminated are tinted yellow. The color is put on with crayons and will take ink if necessary.

During the summer months when Ribes scouting is possible, the pine areas (which include a protective strip around the actual pine stands) are scouted, the bushes being pulled if Ribes are few. Heavy concentrations or areas where Ribes are numerous and generally distributed are set aside by the scouts for crew work. Boundaries of such areas should be painted, although this rule has not always been followed in practice.

Areas where Ribes were eradicated by scouts are tinted green on the Control Data Map, and the scout's estimates as to the number of Ribes per acre, amount of Ribes infection and the predominating species are recorded on the map by symbols. Symbols also record when, in the opinion of the scout, the area should be reinspected for Ribes. Of course, this is only a guess on his part, based on amount, size and species of Ribes present, conditions of moisture, forest cover and lesser vegetation, plus any knowledge he may acquire as to the owner's contemplated treatment of the forest cover. The thing our record does not show, but will in the future, is whether the Ribes are localized or generally distributed.

When crew work has been completed similar data is entered on the Control Data Map for all crew-worked areas which are tinted blue. On such areas the data is obtained by the agent or other checker while engaged in checking or supervising the crew. The agent also indicates on the map the quality of the work done by the letter g,f,or p.

To make this system of recording data most useful, a simple card file is maintained in which are filed the agents' BRE-R cards, which as you know record the details on Interview, Examination and Eradication. These cards bear numbers corresponding to the job numbers in red on the Control Data Map and should be filed according to the year in which the reexamination is recommended. We then have a progressive control record and, once initial eradication has been completed, the cards filed under any one year should indicate the work to be scheduled for that year.

The advantages of this scheme of mapping and record filing are:-

1. It is simple.

2. It concentrates the data in easily accessible form.

3. The maps are uniform as to size, shape, and legend.

4. The maps carry the data that is most likely to be needed in future eradication work and eliminates the rest. Costs and details of educational efforts, owner's attitude toward the work, checks, etc. may be obtained from the BRE-R cards in the card file or from the original daily BR-1 reports.

5. It eliminates the necessity of filing and subsequently handling a lot of maps of miscellaneous sizes and shapes.

6. It provides a simple method of reminding us when re-examination is due.

7. It is economical.

As to the last point, the Control Data Map Sheets of a good rag paper plus printing costs us $20.50 per 2,000 or 1/4 of a mill per sheet. The cost would be smaller on larger orders. The photographic enlargements used for base maps cost probably several dollars each,* but since one base map comprises from one hundred to three hundred blocks, the cost per Control Data Map Sheet is negligible. As to the mapping time required for tracing, I should estimate it to be fully 50% less than the old method requiring pantographing or enlargement by cross sectioning.

CHECKING.

A good deal has been said about checking and it is a subject that deserves a lot of thought. The systems recommended range from simple partial checks to strip checks systematically covering the area. As a preparation for the discussion of checking systems, let me try to express the principles that underlie checking practices.

The purpose of checking is to measure the effectiveness of eradication work. The percent of bushes pulled tells us something of the amount of work accomplished and measures the completeness of the eradication, but it does not express the effectiveness of the work from the standpoint of preventing the spread of blister rust. The old methods of checking were based on this principle and while they served their purpose in lieu of a better practice, we must now concede that the leaf surface remaining is more indicative of the effectiveness of the work. But since the measurement of leaf surface is an expensive task and since the leaf-bearing stem is a pretty fair index of the leaf surface, the latter should be adopted as a basis for our checks.

*Edit:- Actual cost of a topographical sheet enlarged to scale 2 inches to 1 mile, and mounted on cloth, is 96 cents.

Before adopting a checking system, we should consider the conditions under which we are working and the purpose for which the information obtained by the check is to be used.

There are four principal uses for check data:-

1st. To supply administrative officers with information as to the quality of the work being done.

2nd To enable the agent or others charged with the immediate supervision of the work to recognize and correct poor eradication.

3rd To aid the foreman in maintaining a proper standard of work and to keep the crew men "on their toes" by showing them at the time and on the ground the kind of work they each are doing.

4th To provide data as a matter of record. Such records are put to educational, experimental and administrative uses, the chief of which is to furnish data helpful to future control work.

To meet these requirements, three types of checks would be ideal---

1. A crew check, made at the time of eradication by the crew for the purpose of aiding the foreman in maintaining the prescribed standard and to fix for each man his responsibility for missed bushes. As an indication of the efficiency of the eradication work this check leaves much to be desired, but it plays an important part in crew discipline and morale.

2. An administrative check, consisting of an informal examination of the area by the agent or supervising officer for the purpose of assuring himself that the work is being properly done. The value of this check depends entirely on the judgment and ability of the checker.

3. A formal check, made for the purpose of obtaining reliable data as a matter of record.

On all checks the following information should be secured,- size of block, time spent checking, estimated amount of leaf bearing stem per acre. The last two checks should also show whether Ribes are localized or general.

Conscientiousness is the first essential in all three checks. The crew check is entirely mechanical; the administrative check is almost

entirely a matter of judgment, the formal check most nearly approaches the scientific. The best example of the formal check that I know of is Amadon's strip check described by Kennedy at the last conference. If applied according to direction, it minimizes the element of personal judgment, it is representative of the area as a whole, and it is based on the proper standard. (Since writing this paper I have learned that this check is working out less satisfactorily than was hoped for because on small areas the strips taken do not truly represent conditions as a whole on the area).

To my way of thinking these three types of checks constitute the ideal system but in practice they will necessarily be modified to fit the local conditions under which they are used. I agree with Kennedy that it is desirable to adopt uniform checking standards, but I would not want to see the same checking methods required. Frost expresses my ideas on the whole subject of systematic control when he says that he cuts his coat according to the cloth. Where there is lots of cloth, we can have a comprehensive garment,; where the cloth is scanty, we must be content with a skimpy garment as long as it is serviceable.

Speaking of skimpy, yet serviceable garments reminds me that I promised Filler to describe the scout method of checking. It appeals to me as a compromise between what I have described as administrative and formal check with a decided leaning toward the former.

The check is made by the agent or supervisor who scouts the different eradication types on a job, counting missed bushes and estimating the leaf-bearing stem. In types where Ribes were numerous he perhaps makes a quarter-acre check to substantiate his estimate on the leaf-bearing stem per acre. On the basis of this scouting he designates the eradication as good, fair or poor. The method is especially adapted to control work consisting of a great many small jobs where the owner pays a large part of the cost but it can be used successfully on larger areas. The advantages of this method are:-

1. It is simple.

2. It is cheap because the checking is done at the time of crew inspection by one who is already on the ground in the course of his other duties.

3. It furnishes all the information likely to be needed as an aid in future eradication and it answers for the administrative office providing the checker is competent.

4. Because of its simplicity and cheapness it can be made on all areas worked.

It has the following disadvantages:--

1. Its value depends on the judgment and ability of the checker.

2. It is useless as a basis for experimental work.

3. It is not of much value as a permanent record because any one outside the local organization would not know the qualifications of the checker and might be inclined to doubt its reliability.

We use it in Connecticut, supplemented by crew checks and an antiquated system of formal checks. We hope to greatly improve our checking system, but I believe that the scouting check will occupy a prominent place in the new system.

In closing let me make a suggestion for a checking standard.

Let some one determine the maximum amount of leaf surface or leaf-bearing stem per acre that may be left on the area compatible with effective control work. Such a standard would probably have to be determined for certain species or groups of species and for a few types of environment. Such types might be described as open, closed, exposed and pocket. Perhaps this would be an unnecessary refinement, but if it could be determined, it would provide a very reliable basis for checking.

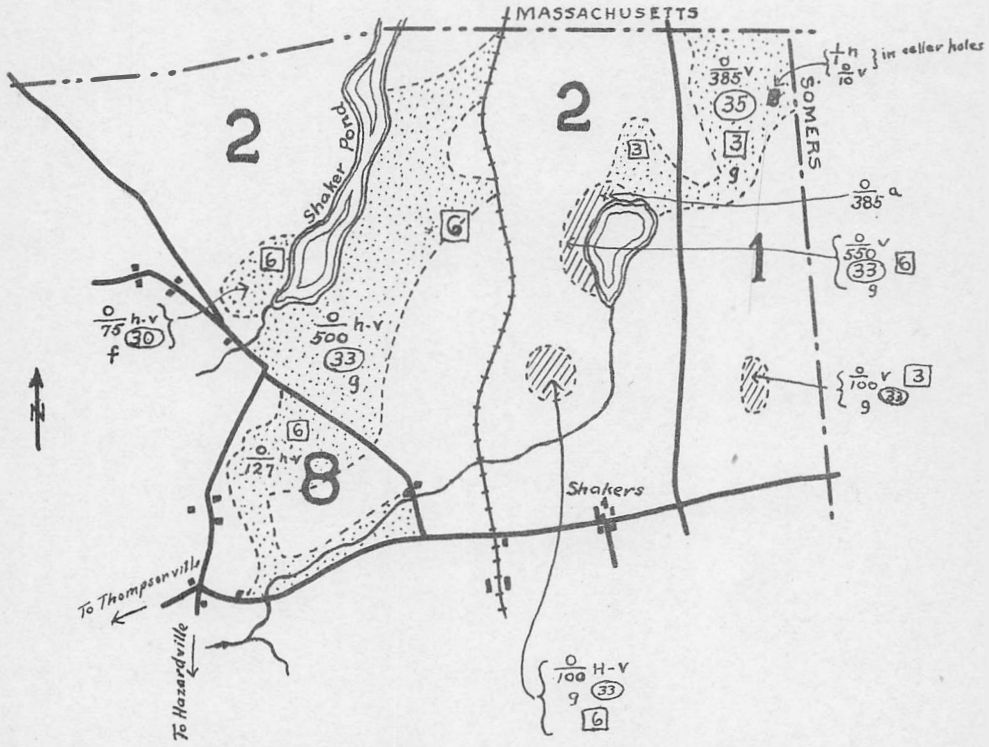
I realize that I have scrambled ideas and descriptions and platitudes, but am trusting that the ensuing discussions will wax hot enough to produce an omelet.

-79-

BLISTER RUST CONTROL DATA MAP
STATE OF CONNECTICUT

Town of ENFIELD

Block Number 1.2.8



Scale—2 inches-1 mile

Map made by R. N. Dodd Title Agent Date completed Aug. 28, 1928

LEGEND

YELLOW	Non-White Pine Area. Date Eliminated (blank on this map)
BLUE	Crew Eradication. Date Worked (cross sectioned on this map)
GREEN	Scout Eradication. Date Worked (dotted on this map)
2	Job Record Reference Number (red)
29	Estimated Date For Re-Scouting
1	Indicates Initial Eradication.... All initial erad.
R	Indicates Re-Eradication
6/20 S	6 Number Infected Ribes ~~per Acre~~
	20 Total Number Ribes ~~per Acre~~
g-f-p	Quality of work as shown on check

S—Predominating Species

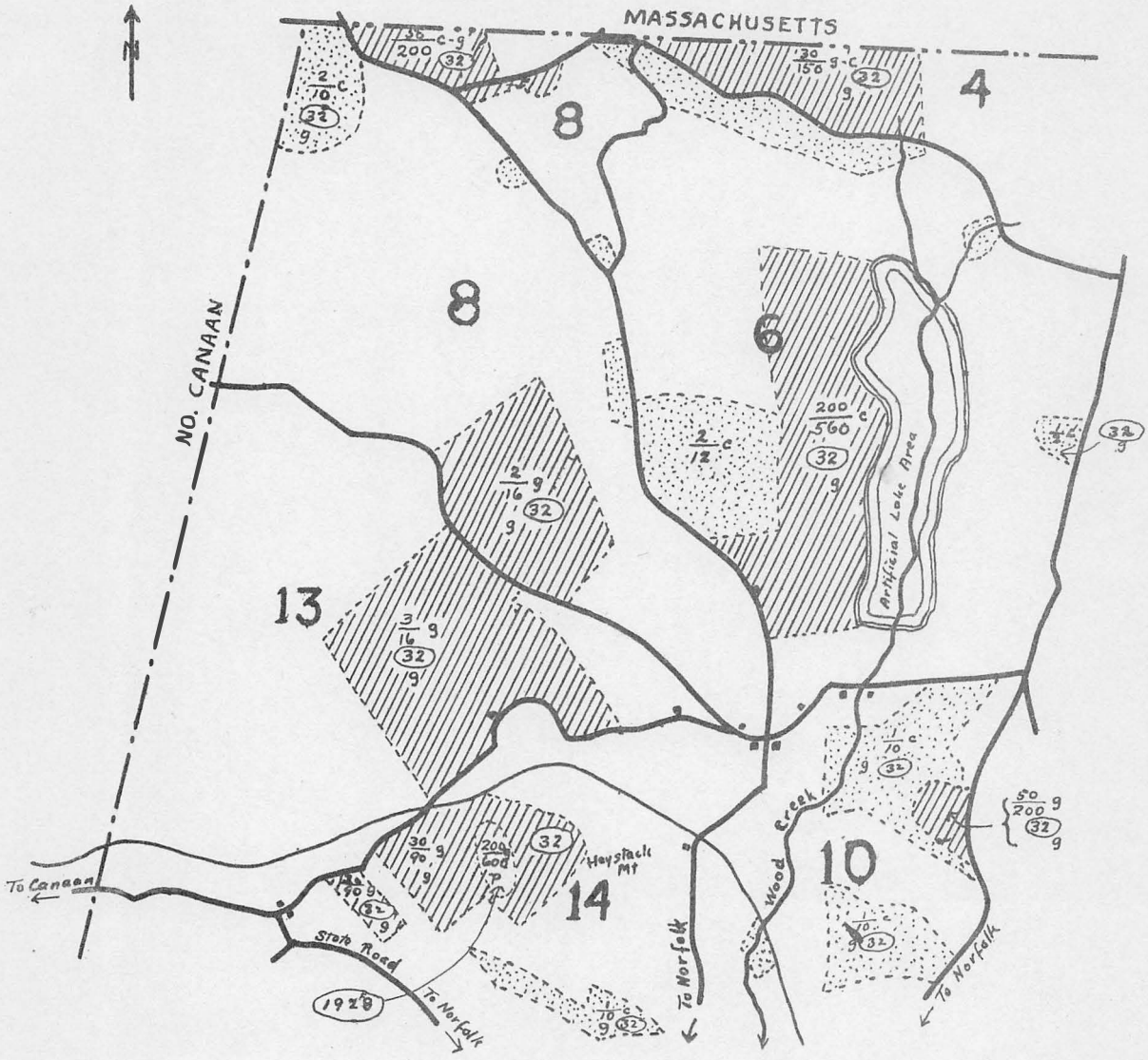
c—cynosbati
g—glandulosum
h—hirtellum
t—triste
v—vulgare
a—americanum
n—nigrum
o—odoratum

J.E.R. Dec. 10, '25

BLISTER RUST CONTROL DATA MAP
STATE OF CONNECTICUT

Town of NORFOLK

Block Number 4.6.8.13



Scale—2 inches-1 mile

Map made by R. C. Perry Title State Scout Date completed Dec. 27. 1927

LEGEND

YELLOW Non-White Pine Area. Date Eliminated (blanks on this map)

BLUE Crew Eradication. Date Worked (crew estimated on this map)

GREEN Scout Eradication. Date Worked (dotted on this map)

2 Job Record Reference Number (red) Town Cooperation

29 Estimated Date For Re-Scouting

Indicates Initial Eradication

Indicates Re-Eradication All re-eradication

6/20 S Number Infected Ribes ~~per Acre~~ per acre

6/20 Total Number Ribes ~~per Acre~~ per acre

g-f-p Quality of work as shown on check.

S—Predominating Species
c—cynosbati
g—glandulosum
h—hirtellum
t—triste
v—vulgare
a—americanum
n—nigrum
o—odoratum

J.E.R. Dec. 10, '28

TRANSIT INSPECTION IN THE ENFORCEMENT OF QUARANTINES

By R. A. Sheals, Agent.

Brief Summary of Results of Transit Inspection

The term transit inspection as used in these remarks means the enforcement of the blister rust quarantines, and incidentally other domestic plant quarantines, by the inspection of shipments of plants and materials the subject of quarantine, consigned by parcel post, express, and freight.

Previous to 1920 no transit inspection had been carried on to enforce any plant quarantine by the United States Department of Agriculture. At that time, the blister rust quarantine (No. 26) restricting the movement of Ribes and five-leafed pines was in effect. During that year an investigation was made at certain important centers or shipping transfer points, which constitute the bottle-necks through which mail, express, and freight is constantly passing in large quantities, to secure data on the movement of blister rust host plants shipped in violation of the Federal quarantine and to determine if transit inspection was necessary and practicable.

Very limited inspection was done at 5 transfer points but complete records are available for only two of these points (Kansas City and St. Louis) where results were as follows:

Inspection Days	Shipments inspected	Violations		Violations per 1,000 plant shipments.
		Nurseries	Other sources	
12	2,680	28	4	12

This work was done at a time when shipments were decreasing in numbers. Estimating 50,000 plant shipments moving across the quarantine line in 1920 (a very conservative figure as shown by inspection in subsequent years) the date indicates that there were 600 violations of quarantine 26 during the year 1920. Certainly it shows convincingly that a quarantine is not well obeyed when there is no provision for its systematic enforcement.

Since 1921 Federal quarantine inspectors have been stationed during the nursery-shipping seasons at railroad centers most important from the standpoint of enforcing the blister rust quarantines.

Summary of Results, 1920 - 1927.

Shipments inspected.....	709,954
Blister rust violations.....	1,102
Violations per 1,000 shipments, 1920.....	12
Violations per 1,000 shipments, 1924.....	1.8
Violations per 1,000 shipments, 1927.....	1.1
Percentage of violations by nurserymen, 1920.....	89
Percentage of violations by nurserymen, 1927.....	54

It will be noted that inspection carried on over a period of seven years time has resulted in greatly reducing the number of violations per 1,000 shipments inspected as well as the percentage of violations by nurserymen. It is estimated that from 75 to 85% of the total shipments passing through the transfer points were inspected.

All the violations listed in the above table were of the blister rust quarantines. As the inspectors were paid from blister-rust funds and had all they could do on this quarantine alone, they could do little searching for violations of other quarantines. However, authority was given them to intercept violations of other Federal plant quarantines, and in 1927 and 1928 some attention was paid to this matter. Following are the violations for the year 1927 classified according to quarantine:

Violations of Quarantine No.				63 (White Pine Blister Rust)	- 289
"	"	"	"	38 (Black Stem Rust)	- 2
"	"	"	"	45 (Gipsy and Brown Tail Moths)	- 7
"	"	"	"	48 (Japanese Beetle)	- 55
"	"	"	"	53 (Satin Moth)	- 21
				Total.....	374

It is worthy of note that of the 55 violations of Quarantine No. 48 (Japanese beetle) several of the shipments from heavily-infested territory had from 2 to 10 lbs. of earth around the roots of the plants-- a dangerous condition. These violations originated for the most part in or adjacent to Philadelphia and nearby New Jersey points where infestation is severe.

TRANSIT INSPECTION IN CHICAGO, ILLINOIS.

Since Chicago is the point through which more shipments of parcel post, express and freight are transferred than at any other place in the country, a brief summary of the details of inspection will give a general idea of the problems presented and how the solution is attained

Problems presented:

A. Parcel Post - 10 inspection points.
B. Express - 15 inspection points.
C. Freight - 250 inspection points.

To carry on the inspection work at the 275 inspection points there were four inspectors available last spring.

Solution of problems:- It can not be said that the problems are entirely solved but the organization of inspection methods has been carried to a point where the only serious drawback is shortage of inspectors. The methods of inspection of parcel post, express, and freight are summarized.

A. Parcel Post.

(1) Outside parcel post. - By outside parcel post is meant that routed outside locked sacks. Such packages are available for inspection when trains are unloaded. Detailed studies of all trains entering Chicago have been made. The packages have been counted and the origin noted. This information has been checked with transfer clerks who are familiar with the volume of mail carried on each train. From this information inspection tours are arranged whereby the most important mail trains are met each day. Other trains are checked systematically.

(2) Sacked parcel post. - Sacked parcel post is consigned to the Van Buren parcel post station where it is dumped on conveyor belts or carried direct to destination state distributing racks. Inspectors are stationed at the main conveyor belt constantly during the time when the greatest volume of transit parcel post may be seen. Checks are made at other periods. In addition every mail clerk working in the building cooperates by holding for inspection all shipments not detected by inspectors. Studies of methods of handling parcel post in this building have been carried to a point where it is possible for an inspector to tell within 30 minutes of the time when mail from any given train may be seen on the main conveyor belt or at the state racks.

B. Express.

This problem is somewhat similar to that of outside parcel post and the solution has been developed along the same general

lines. No belt systems are used. The employes by agreement pile all plant shipments in certain definite places where they are readily available for inspection. Checks are made so that important out-bound as well as in-bound express trains are met.

C. Freight.

Four inspectors can not possibly inspect at 250 freight stations daily. The excellent cooperation of all transportation officials is well illustrated by the assistance of freight officials in enabling our inspectors to find a solution to this problem. Arrangements have been made whereby each freight company sends each day exact copies of way-bills on all plant shipments. The way-bills are usually in the hands of the inspectors from one to four days ahead of the arrival of the shipment. Inspectors then determine what shipments are to be inspected and tours are made accordingly.

EXPRESSION OF OPINION ON VALUE OF TRANSIT INSPECTION BY A STATE OFFICIAL.

Several State nursery inspection officials and others interested in quarantine problems have studied the inspection organization and methods of work in Chicago. Part of a report by Dr. W. A. McCubbin, State Pathologist of Pennsylvania is quoted to show the consensus of opinion of these representative State officials concerning the work. Dr. McCubbin wrote:

"I am free to confess that before seeing this inspection in actual operation I had a rather low opinion of its probable efficiency. It had seemed so impossible to cover with inspection more than a small fragment of the great tide of trade movement that the value of this inspection in quarantine enforcement was doubtful, but having seen the system of elimination, the various checks provided, and the schedule and methods followed, I am convinced that in regard to all forms of traffic except that arising from irresponsible private violators, this method of stopping forbidden shipments is not only economical but very efficient for the purpose. At present it is not complete over all the strategic points but if it can be enlarged to the point of caring for all the channels of mail and merchandise, it is likely to give an assurance of protection that will compare most favorably with all other efforts to enforce quarantines."

BLISTER RUST DAMAGE IN THE ADIRONDACKS

By W. H. Snell

The object of my work for the New York Conservation Department has been the determination of damage to white pine by blister rust. The idea was not only to get at the exact damage being done, but also to obtain that damage in the proper terms - that is, in terms of loss in board feet rather than in terms of per cent of infection.

In order to obtain data upon damage, new methods had to be developed. The principal features of these new methods were two: the abandonment of per cent of infection as the criterion and the development of the concept of "imminent mortality", the sum total of the trees now dead and those doomed to die; increased attention to the future forest in this determination of loss, more study of trees which are going to survive than of those which are going to be lost. The principal aim of Forest Pathology is not so much the study of diseased trees as the saving of forests. Forest Pathologists have thus far been unable to see the forest for the diseased trees.

The new methods used in these studies embrace three phases: one, the pathological study; two, the making of a map of the area; and three, the estimate of damage.

1). The pathological study embraces the study of the disease conditions of each individual tree with the taking of elaborate notes upon form sheets for the ultimate purpose of determining whether the trees would survive or be killed. These studies resulted in the determination of imminent mortality, i. e. the total of the dead and doomed trees. At the same time, data were taken upon the surviving trees, their condition, and likelihood of surviving and their promise as to lumber production.

2). As the pathological study was being made, the trees on the experimental plot were mapped on cross section paper to scale with their pathological and health conditions represented by proper symbols.

3). The estimation of damage is fraught with difficulties but some such attempt is necessary and anything of the sort is preferable to persistence in speaking of disease conditions in terms of per cent of infection or even in per cent of imminent mortality. The following factors were given consideration:

a. Reduction of the number of trees by disease.

b. Reduction of the forest cover, if any.

c. Kind of trees left.

Under kind of trees left, one of the most important considerations is crown development, Other considerations are injuries to trees by insects, storms, etc., and also the branchiness of the trees.

d. The spacing of the trees.

Upon the spacing of the trees depends the value of the lumber to be produced. Another consideration is the loss of trainers through the disease.

The actual estimation of the disease has been attempted in various ways. The most satisfactory method thus far attempted has been the balance of two estimates. The first is an estimate of the potential lumber production of the lot without any interference by blister rust. This is made on the lot by an experienced forester if possible and may also be checked by a use of the map. The second estimate – of the potential lumber production of the pine lot taking into consideration the present pathological conditions – is made from the pathological map perhaps with the help of various mechanical devices, and is checked by an estimate in the field. The balance of these two is the loss factor expressible in terms of thousands of board feet or in per cent.

A table will present the fact on a few lots:

	No. of trees & Size of lot	Age of trees	Per Cent Infection	Per Cent Imminent Mortality	Estimate* Loss in Board Feet	
Kelm Mt.	1107-2 acres	15-19	96%	87%	50M / 50M	95-100%
Horicon	1351-1 "	14-23	60%	53%	40M / 50M	80%
Whalen	955-1 "	20-28	64%	56%	30M / 40M	75%
Downes	474-1 "	21-28	56%	52%	13M / 20M	65%
Dannemora	1723-2-1/2"	14	52%	51%	30M / 80M	37%
McCormick	1116-1/2 "	20-22	27%	26%	0 / 25M	0
Sternberg	3530-4/5 "	5-20	28%	25%	0 / 50M	0

* The numerator indicates the estimated loss in board feet, the denominator being the potential lumber production of the lot without any interference from blister rust.

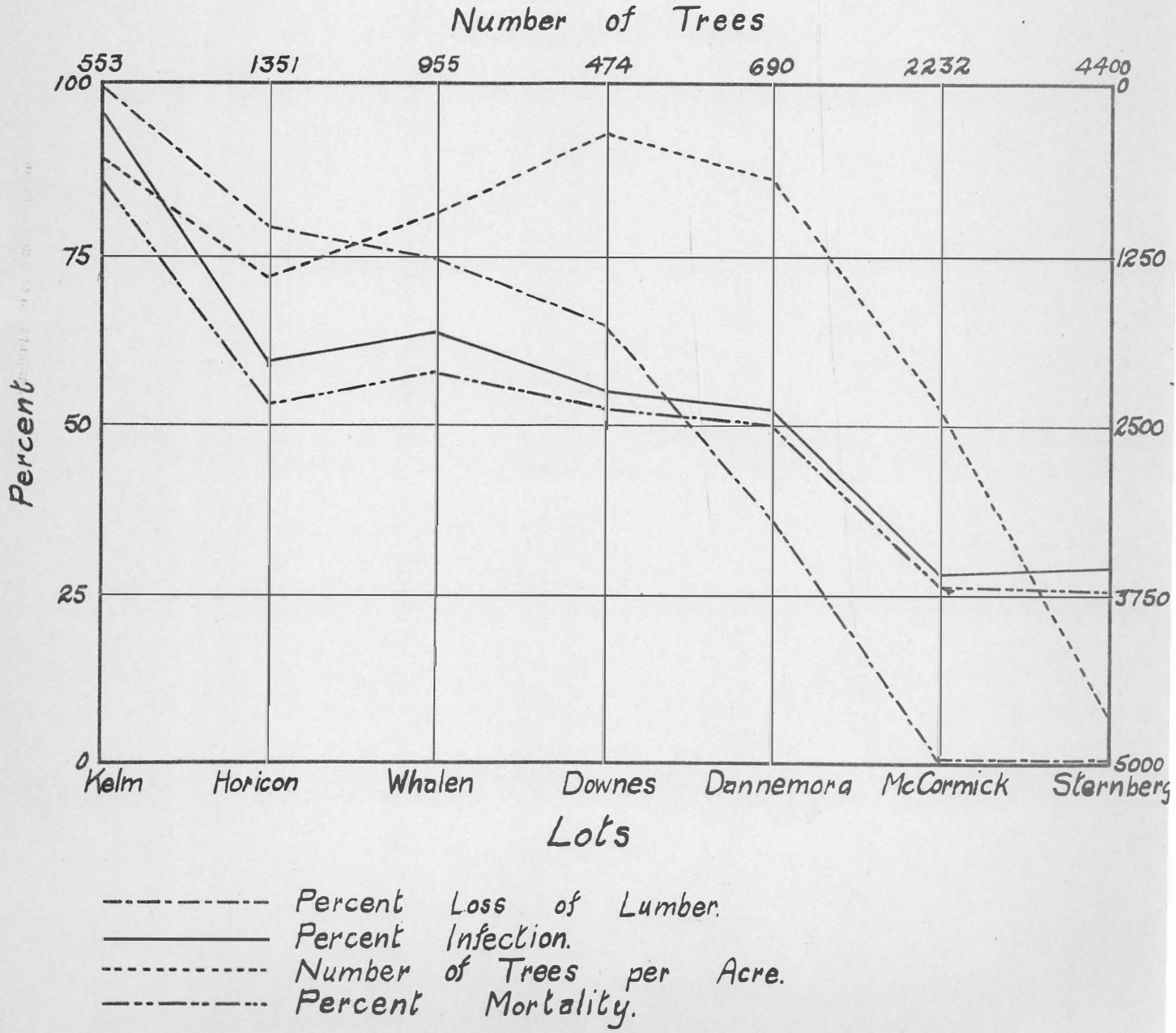
In view of some of the facts stated at the beginning, there is some interest in the relation between the estimated loss in board feet and per cent of infection and per cent of imminent mortality. These data are represented in figure 1.

Question: What proportion of trees die at what ages?

Answer: 100% when attacked up to five years old
95% up to ten years old
12% up to 20-25 years old.

Figure 1.

Graph Showing Relation of Percent of Infection and Percent of Imminent Mortality to Loss in Board Feet per Acre on Certain Lots Studied in the Adirondacks, 1923 to 1928.



THE EUROPEAN LARCH CANKER IN MASSACHUSETTS.

By Perley Spaulding

I speak of this newly discovered disease only as it occurs on larch as you have an excellent chance to see for yourselves what it is on Douglas fir here at Potowomut Neck (Warwick, R. I.), where it occurs in a typical manner. In work done during the summer all cankers found on European larches were saved tree by tree. The number varied all the way from single large cankers on a tree to as many as 175 on a tree 35 feet tall. Samples are exhibited here showing all of the variations that occur. The disease kills the trees or cripples them so that they never will make timber; their chief use being for fire wood.

An eradication campaign is being waged, since there seems every chance of its being successful if all known infections are removed and burned. The disease has been here about 20 years. Our other serious epidemic forest-tree diseases of foreign origin have taken about this time to get well under way before they were discovered or before they could be gotten under control. We are apprehensive that this one, which up to now has shown no signs of spreading from the immediate vicinity of the affected imported plantations, may suddenly take on a new lease of life and duplicate the careers of the chestnut blight and the white-pine blister rust. The prospects are good for the early eradication of all the known trees affected by larch canker in Massachusetts, which is the only State except Rhode Island now known to have any of the disease. If we can get rid of this pest thus easily we may congratulate ourselves.

Question: Is there any alternate stage?

Answer: No, disease spreads from tree to tree - found on native larch.

PLANNING AND ARRANGING AN EXHIBIT

By G. E. Stevens

To be frank, Gentlemen, I do not see where I can contribute much in the way of "Exhibit Planning" to what has been given you in the past on this subject. Furthermore, most of you men have had experience in planning and setting up exhibits and have made other observations in the field. To come to you, therefore, and try and talk to you on this subject would be like trying to tell Doc Snell how to play football.

But first, what is an exhibit? Webster says, "An exhibit is an article or collection of articles displayed to view." And to exhibit is to present to view in order to attract notice to what is interesting or instructive or for purposes of competition or demonstration.

Nevertheless, more and more, Extension and Educational workers as well as commercial organizations are turning to the Fair Exhibit and Window Display to supplement other means of putting their work before the public. They are using exhibits because ideas thus presented, are more readily understood by the public and because the public becomes more interested in what they see rather than in what they read or hear about. People are attracted by good exhibits and will stop and study them who would not otherwise read the news or attend the ordinary meeting. Exhibits are set up to appeal both to those most likely to use the lesson and to those who can help most to advance the cause.

Exhibits are especially helpful in creating new extension activity, in telling of new products, of new uses for old products and in showing how they aid and serve best. Now the public requires prodding from time to time, not only to create in it new wants but actually to induce it to accept that which it frankly needs. Since people are inclined to take the line of least resistance, most of them respond more readily to suggestion than to argument, especially if the reasoning involved requires considerable effort. Thus good exhibits hasten action while general publicity creates but thought. But since the profession of exhibits like advertising is still young, there is little literature available to follow, hence we must learn this work from actual experience and observation.

Now one cannot lay down positive and complete rules to be followed in planning exhibits for so much depends upon the locality where the exhibit is to be shown, the character of the people to be reached, space, funds available, etc. Nevertheless there are several steps in Exhibit Planning that should be followed if success is to be assured.

The first step in exhibit planning is - Aim and purpose of the exhibit. A definite purpose is the first essential in planning an educational exhibit. The greatest need in most exhibits is more emphasis on the dominant idea and less on details.

The second step is - Know something of the character of the people to be reached and competition with other exhibitors. Your method of approach, explanatory appeal, etc. will naturally vary. For example, the same technical charts used before a scientific conference cannot very well be used before the general public.

The third step is - Available space, what you are to exhibit and best type of exhibit to use. Certainly you should not leave the selection of space go to the last minute. Be certain of the space, where you are to exhibit, its size, shape, etc. Whether it is aired, does it have counter space and wall space. Knowing this information beforehand may save a lot of embarrassment later. And knowing the space beforehand might answer the question whether you are to fit the space to the exhibit or to fit the exhibit to the space.

The fourth step is - Means of attracting attention and holding interest at the exhibit through moving, living or unusual objects, strong or intermittent colored lights or electric signs, bright colors, mechanical devices, odors, music or guessing contests. Whatever device or form of attraction is used, however, it should have some direct bearing on the exhibit. For example, live fish in a tank or live game of some sort depends on forests for their life and hence has a direct relation to our work. Guessing contests are exceptionally good as they attract and bring people to the exhibit. In New York this past season we used a cross-section of white pine at some exhibits while at others we used a large pile of pine cones. There was something unique about them and people were led to ask such questions as:

How can you tell the age of a tree?

Does each ring represent a year?

Does the tree put on the same amount of growth each year?

Or, If I plant a cone will a tree grow up from it?

Where do the seeds come from? and various other questions of a similar nature. Answering these questions opens a way to personal contact and winning of confidence; often resulting in actual "sales."

The fifth step is - Influencing people to act by appealing to strongest motive. The strength of the appeal depends upon what is uppermost in the mind of the individual whether for gain, sentiment, ambition, pride, justice, hate, reason, fear or caution. Experience along this line has taught us that many of our cooperators in the past were won through their love for trees.

The sixth step is - Arranging exhibit material and use of explanatory material. Since an educational exhibit cannot very well compete with amusements, barkers and other noisy features at the fair, the exhibit should be

planned in relation to other educational exhibitors. Explanatory material such as charts, maps, photographs, etc., should be simplified and not too numerous. However, oftentimes the most elaborate and costly exhibit sells the least goods because there is lacking some phrase or wording to actually tell the public what the exhibit is trying to sell or to put over. An exhibit without a poster is like a salesman without a voice. See that the exhibit has a good caption to tell what message the exhibit is endeavoring to convey. Make the whole story easy for the people to understand.

The seventh step is - Advertising the exhibit. A lot of you will say that you did not get the crowds out to see the exhibit that you had expected. The exhibit should be advertised through advanced articles in newspapers, county fair premium lists, advanced announcements, posters, letters, etc. One method we used in New York at several of our fairs was to send letters to all the pine owners or to the tree planters in the county, telling them of how the Conservation Department planned displaying a forestry exhibit at the fair and that if they had any questions they would like answered, to come and see us at the fair. As a result, a lot of people came up to the booth with a long list of questions they were interested in having answered. This practice makes personal contact and wins great moral support. It has also brought people to the fair that would not come for any other reason.

The eighth and last step is - Supervising the exhibit and plans for following up contacts made at the fair. If an exhibit is worth enough to spend time, money and energy arranging it, then it should be worth enough to have proper supervision. Without proper supervision many of our exhibits have been a failure. Men should have some preliminary training before being left in charge of the exhibit, and arrangements should be made for someone to be at the booth at all times. Also what a waste of time and money it is to arouse interest and determination at the exhibit by getting a list of prospects and then fail to follow up those prospects later, when through a little planning and follow up work many of those prospects could be turned into real cooperators.

It will not be necessary for me to go into further detail on these rules. If we make an attempt to follow them as closely as possible, we should have no trouble in putting over the exhibit with marked success.

But perhaps one of the most important factors in exhibit work is the best type of exhibit to be used. As mentioned before, the type of exhibit to use depends largely upon available space, people to be reached, subject matter, funds, etc. For sake of discussion, I will mention briefly, several of the more important types that are used commonly among exhibitors.

First, Contrast and Comparison; This type is usually effective in bringing out the lesson to be portrayed.

Second: Concealed; This type is one in which the main feature is hidden so as to arouse curiosity and make people go out of their way to see it.

Third: Mural or Wall Type; This exhibit frequently consists of a painted background against which the natural objects in the foreground look like a continuation of the objects in front. For example, actual living trees shown in the foreground blending into a picture of forest covered mountains in the background.

Fourth: Miniature; An exhibit of small models or objects to represent buildings, forests, people, and material, which would be too large to show in the exhibit.

Fifth: Exaggerated; The opposite of miniature exhibit where the enlargement of objects are used to attract attention or to bring out details. The Mural or Wall type is often used in combination with the Miniature or Exaggerated Type.

Sixth: Booth Assembly; An assembly of exhibits on the same or related subjects in adjoining booths, or separated by partitions in the same booth, each showing an important step in a process.

Seventh: Direct Lesson.

Eighth: Miscellaneous.

In summarizing these types, therefore, there is little difference in the popularity of the type of exhibit used for they are all popular. I will pass among you several pictures of exhibits that I received from the Office of Exhibits at Washington and also a few of our own exhibits in New York. And I have marked them in order to give you some idea of what I mean by types of exhibits. In comparing various types with one or another, you will find that they all stand out with force, and that it is not so much a matter of type of exhibit that counts but the idea thus presented in that particular type. Now since I have given you the several steps in Exhibit Planning and touched briefly on the types of exhibits used, let me now make mention of what I consider the most important factor of all in exhibit work and that is Creation of Ideas. As they say about a writer, that he must have imagination and creative ability in order to write, so it is with the exhibitor in that he must have imagination in order to work out ideas for exhibits. We all possess some imagination along this line, the next step is to use it. Sometimes the mere suggestion from one may suggest to the mind of another an idea that later may develop into a corking good exhibit. We should, therefore, make note of ideas or suggestions that come to mind from time to time and jot them down for later use. It will be surprising to us to see from where we will get many of our ideas. You can gain much knowledge of preparing attractive and convincing exhibits by studying window displays in your local town or exhibits at fairs and demonstrations. See if the idea used in those displays could be worked into your own exhibit.

For example of what I mean by ideas let me refer you to these two panels that you see before you. The ideas for a 5-wing blister rust panel was worked out from a Forest Service Fire Display and the 5-wing reforesting panel is a revision of the new 5-wing blister-rust panel gotten out by Mr. Pierce. The top of this reforesting panel is original but much of the wording is a duplication or copy of phrases commonly used in our work. Much of the material on the blister-rust panel is a copy of past phrases, nevertheless it is simplified, not overcrowded and the message we are endeavoring to convey stands out. So let me emphasize at this time that whenever you are preparing an exhibit, after you have an idea, keep in mind simplicity. Make your exhibit a one-idea exhibit and it will not only attract more attention but hold that attention longer. We are all convinced that simplicity is the keynote of advertising that is successful, hence simple exhibits sell the most goods. And since it is estimated that an observer spends about one minute at an exhibit, the display, therefore, must tell an interesting story and tell it quickly. Let us therefore refer to these two panels again to illustrate this point. In the reforesting panel, the message we wish to convey is to reforest the thousands of acres of idle land in this State with trees. If the observer, therefore, going by the exhibit sees nothing else but the caption, "Plant Trees on Idle Lands" he will immediately get the message we wish to convey. Should the observer own land, he immediately gets a suggestion what to do with that land. Should he become interested, there is enough reading matter following to answer the usual questions that would come to his mind. In the case of the blister-rust panel, a similar idea is carried out. The words Eradicate and Perpetuate answer the question, How Best to Save the White Pines?", and there is sufficient reading matter following to be of interest and simplified enough to be understood.

Of course these two panels are not at all perfect in every detail but at least they can give us subject matter as a basis to talk upon and an idea from which to perfect other ideas. Now since ideas are the big factor in exhibit planning, often times we make one big mistake if indeed we don't make it all the while and that is judging the appeal of others by what appeals to us. We all must admit this fault and hence should endeavor to guard against it.

Though we will agree that the amount of available funds determines to a large degree how elaborate or extensive we may go in preparing certain types of exhibits and carrying out ideas, nevertheless in preparing any kind of an exhibit, the exhibit must be self-explanatory, straightforward, and convincing.

In our work as in other fields of work, educational extension is one of the greatest problems when we have something to sell. If we have something the public wants and yet the public does not know that we have it, then we fail. If we have what the public wants and we let them know that we have it, failure is impossible. So in conclusion, therefore, let me emphasize to you to remember that when you are preparing an exhibit, there are five things you must do.

First; You must make people see it.
Second; You must make people read it.
Third; You must make people understand it.
Fourth; You must make people believe it.
Fifth; You must make people want it!

If the exhibit fails in any one of these five things, then it fails in all five.

Question: Do you use motion in your exhibits? In Rhode Island, we have used the revolving forest fire exhibit.

Answer: Such exhibits are all right provided the moving object does not take all of the attraction. Motion of some sort to be used in future blister rust exhibits - a revolving exhibit would attract.

Question: Are the words "eradicate" and "perpetuate" simple enough?

Answer: These words taken from blister rust posters - question whether or not they are too complicated.

Pull up, destroy and control, favored by several present.

Remark: At Waterville, Maine, Fair exhibit was so well liked that the Board of Directors decided to pay for the space. Number of people in other agents' districts reached through his exhibits this fall.

Following Stevens' talk on "Planning and Arranging an Exhibit", Agent Endersbee explained the blister rust panels on exhibition, which are now in general use in western Massachusetts. This type of display was originated by Agent Doore, and the first exhibit placed at Conway, Massachusetts, in June, 1927. This year the idea was developed by Messrs. Endersbee and Doore, and modified somewhat by some of the other Massachusetts agents until there are several variations of the original. These features consist of a frame made out of boards according to the size of exhibit desired - 2" by 3" are used for the larger ones, while 1" by 1" material is sufficient for the smaller ones. The uprights of the frame may be set into the ground or they may be given "feet" so that the display will stand upright on the ground or floor. Specimens used in the panels can be any length up to five feet and any diameter up to the limit that can be found in the locality - the frames being dimensioned to best accomodate the specimens available. Signs pictures, etc. taken from old posters and postcards, have been worked into the smaller displays. The infected specimens are also tagged. The signs, pictures, tags, etc. are all coated with clear lacquer to help preserve them from adverse weather.

Large exhibits have been placed in many prominent and conspicuous places, such as: Hairpin Turn on the Mohawk Trail, Summit of Jacob's Ladder, etc. There are numerous medium-size panels on exhibition at various picnic groves, bathing beaches, libraries, information booths, and offices of the Extension Service. It is estimated that from 30,000 to 50,000 people visit these resorts each summer.

SUMMARY OF 1928 BLISTER RUST CONTROL WORK IN NEW ENGLAND AND NEW YORK

By K. K. Stimson

The eradication season of 1928 will doubtless be recorded as one of excessive rainfall. Judging from reports, all States shared alike in this respect. However, in spite of adverse weather, good results were accomplished in blister rust control. Apparently, the handicap of inclement weather spurred the men on to increased efforts, as four of the seven cooperating States in New England and New York cleared a larger acreage of Ribes than during the previous year. Decreases in the other three States, however, brought the total for all States to approximately 20,000 acres less than in 1927. A detailed comparison of the 1927 and 1928 control activities in New England and New York is given below:

		% Increase or Decrease 1928 over 1927
Cooperation		
Number towns appropriating	145	+ 16.0
Town expenditures	$39,038.73	+ 1.9
Number individual cooperators	4381	- 1.1
Individual expenditures	$54,517.68	+ 11.2
Acreage Examined		
Individual cooperation	318,331	+ 9.2
Town cooperation	218,986	- 0.7
State scouting	318,517	- 13.5
State land projects	19,091	+ 35.4
Total (initial and re-eradication)	874,925	- 2.2
Total (re-eradication)	113,595	+ 12.3
Ribes Eradicated		
Wild	6,669,063	- 16.9
Cultivated	57,797	+ 18.6
Wild per acre	7.6	- 14.6
Eradication Costs		
Total	$157,367.38	+ 2.7
Per acre	$0.13	+ 5.3

The above summary does not include 4887 acres cleared of Ribes in connection with the nursery sanitation projects in Connecticut and New York, nor 300 and 1500 acres, respectively, worked in Wisconsin and Michigan during 1928.

The results accomplished this year in blister rust control speak for themselves. You men are to be congratulated on this splendid record.

THE RESULTS OF A SCHOOL SURVEY TO DETERMINE LOCATION OF RIBES INFECTION IN MICHIGAN

By D. J. Stouffer

The School Survey being conducted this fall to locate white pine blister rust in Michigan is not yet fully completed. However, the following account will give the results to date:

The plan of procedure is patterned after and essentially the same as that recommended by Dr. W. A. McCubbin of the Pennsylvania Department of Agriculture and used so successfully in that State last year. The forms used by Dr. McCubbin were revised by Dr. J. F. Martin to fit the Michigan situation.

The matter of securing school cooperation was first taken up with Mr. E. E. Gallup, Supervisor of Agricultural Education who was furnished with an abundance of material on the rust. Mr. Gallup acquainted himself with the rust, its nature, manner of spread, host plants, resulting damage and distribution in Michigan. This information was then presented by him to Hon. W. H. Pearce, Superintendent of Public Instruction who gave his hearty support to the plan.

Each County Commissioner of Schools was then requested during the summer to furnish the Michigan Department of Agriculture with a list of the names and addresses of his rural school teachers. A list of the names and addresses of Agricultural high school teachers was furnished by Mr. Gallup's office. Only three counties were able to provide such a list by the first of September. In most cases final lists would not be made up until October.

The teacher's packets containing the necessary materials for the survey were made up about the first of September and sent direct to the teachers in the three counties furnishing lists and to the Agricultural high school teachers. The teacher's packets for the other counties were shipped in bulk to the County Commissioner's office of his respective county for distribution by him to his teachers.

Results to date (November 15, 1928) :

Packets sent rural teachers	6,971
Packets sent Ag.H.S.teachers	169
Total packets sent out	7,140
Reports received	460
Packets returned	17
Total accounted for	477

Reports containing rusted leaves	19
Number of counties sending at least one report	69
Number of counties sending no reports-	14
New counties found infected thru School Survey	10
Counties found reinfected thru School Survey	4
Total counties found infected thru School Survey	14

Of the fourteen counties, four were known to be infected previously. Five of the newly infected counties are in the Upper Peninsula. No blister rust had ever been reported found in this region prior to this time. The other five new counties are in the northern half of the Lower Peninsula.

These ten new counties together with three found infected by State and Federal scouts this season make a grand total of thirty-one counties now known to be infected with white pine blister rust. This area comprises over one-third of the total area of Michigan. It extends in a solid band across the State from the "Thumb" region on the east to Oceana county on the Lake Michigan side. Infected counties are widely scattered north and south from Cass in the southern tier to Cheboygan at the northern end of the lower peninsula besides the five new counties in the upper peninsula.

Altho the number of reports accounted for have been far too few, the finding of the rust over such a wide area (especially new counties) is certainly remarkable. The education value of the Survey can not be estimated closely but an indication may be gained from the number of requests received both in the Washington Office and in the Michigan Department of Agriculture for additional information about the disease.

Approximately one teacher out of every five reporting, and several students have written for more detailed facts about the rust.

Question: What sort of material other than colored photographs have been used?

Answer: The packets we used were identical with those made up by the Pennsylvania people last year, containing large franked envelopes, 15 small envelopes and colored card showing blister rust on Ribes leaves.

Question: What were the instructions sent to the teachers?

Answer: A set of directions and information and a report sheet.

CULTIVATED BLACK CURRANTS VERSUS WHITE PINE IN WESTCHESTER COUNTY, NEW YORK.

The results of a survey of cultivated black currants, R. nigrum L., made in Westchester County, New York, last season, emphasizes the menace of this species to the growing of white pine. Because of the fact that blister rust spores produced on these currants may infect white pines within a radius of one mile or more, even a comparatively few bushes distributed promiscuously about a township might endanger a large proportion of the pine in that township. This point is demonstrated forcefully by the results of the survey in the township of Bedford.

The township of Bedford, located in the northern part of Westchester County, includes many large and beautiful estates. According to records from the State Conservation Department, over 245,000 white pine trees grown in the State nurseries have been set out in 90 plantations. In addition, the City of New York has planted several miles of shore line to white pine on its Cross River Reservoir. There have also been planted many thousands of white pine trees obtained from private nurseries of which we have no complete records. There is no doubt but that a good many dollars have been invested in white pine plantations in the township of Bedford, and that the present esthetic value of these trees is very high.

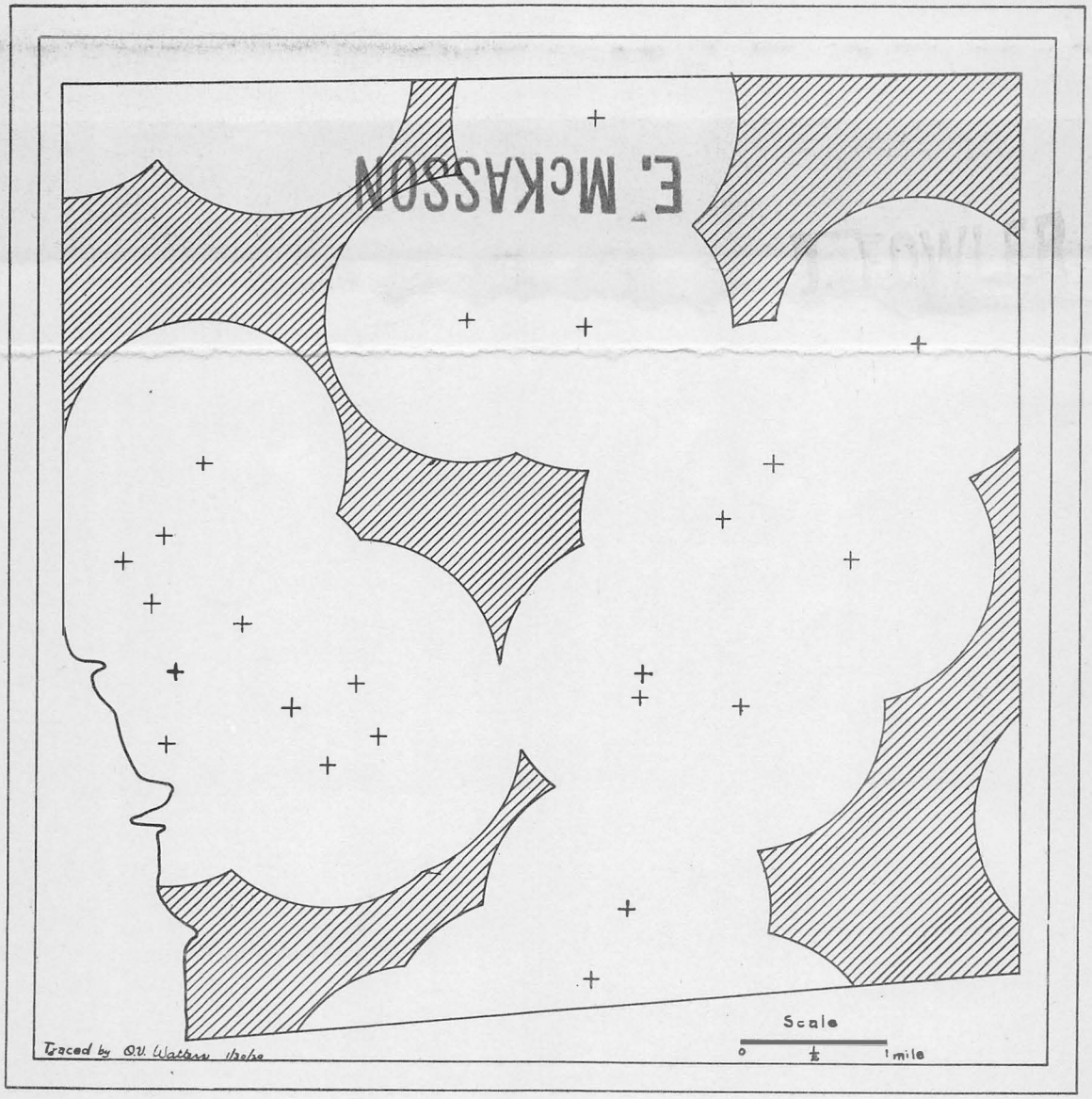
In this township, 163 cultivated black currants were located and destroyed during the past season. These were found in 23 separate locations as shown on the accompanying map. Cultivated black currants were also located in adjoining townships in eight locations within one mile of the Bedford town line. The area within one mile radius of one or more of these cultivated black currant plantings, and hence well within their infecting range, is outlined on the accompanying map. This unshaded portion of the map represents 76% of the 26,573 acres in the township. In this township, therefore, the white pine being grown on 20,195 acres or 76% of the total area of the township, was exposed to blister rust infection from a relatively small number of cultivated black currants situated in but 31 locations.

Customary local control methods, consisting of the removal of Ribes of all species from the plantations and from a protective zone 900 feet wide around the plantations might remove an occasional planting of cultivated black currants, but would not protect the planted pine from the more distant groups of these bushes. Complete protection of these white pine plantations necessitates the 100 % removal of cultivated black currants in the township.

Cultivated black currant conditions in the township of Bedford are representative of conditions in many other townships in the State. In the township of Greenburg, over 1,400 cultivated black currants were removed. A similar map of their locations in this township would show that the total area was within the zone of disease spread from these bushes. These examples illustrate the need for the complete extermination of the cultivated black currant in white-pine regions as a general control measure.

H. G. Strait, N.Y.

CHART OF THE TOWN OF BEDFORD, N. Y.
SHOWING THE LOCATION OF CULTIVATED BLACK CURRANTS
(R. NIGRUM) AND THE
AREA WITHIN ONE MILE RADIUS OF THESE BUSHES



LEGEND

Area (24%) more than one mile distant from Ribes nigrum.

Location of Ribes nigrum plants in Bedford.

Area (76%) within one mile radius of Ribes nigrum locations.

THE WOODGATE RUST

By H. H. York.

The Woodgate rust is known to attack only hard pines. It is a stem rust and produces knob-shaped swellings, the margins of which are usually marked by a definite rim or collar of bark. . . . . This fungus is unlike the vast majority of rusts, in that it apparently forms only aeciospores. These spores are produced almost entirely during the month of June. The Woodgate rust was first discovered on Scotch pine in the northeastern United States, in June 1925, near Woodgate, N. Y., hence the name which this disease receives.

Thus far it has not been possible to determine how, or the exact year when this rust was introduced at Woodgate, which is the oldest known center of infection in New York. Gall rusts are not known to occur in Europe. There seems but two possible sources of introduction, either from Asia or the Pacific slope of the United States where a number of species of such rusts are known to occur. Unfortunately, the identity of these fungi is quite imperfectly known; therefore the delay in assigning a definite specific name to the Woodgate rust.

At the time of its discovery, it was quite apparent that the Woodgate rust had no alternate hosts in the vicinity of Woodgate. This situation led to a series of experimental inoculations in 1926 to determine whether the aeciospores of the Woodgate rust could directly infect Scotch pine trees. More than 1000 twigs of Scotch pine trees were inoculated. The result of these experiments demonstrated beyond a doubt that the Woodgate rust is an autoecious rust, i.e., one which requires no alternate host.

During the summer of 1926, the age of the galls was determined and counted on 400 Scotch pine trees of various ages. These data and that obtained from other studies showed that the rust was introduced in the vicinity of Woodgate about thirty years ago and that it had barely more than existed in its new home until about 1920, when it began to spread very rapidly. When this count was taken, the infections on the 1925 stems were not sufficiently advanced to be recognized with surety, hence they are not included in the data which follow. The oldest gall observed was on 1895 wood. Beginning with this one gall up to 1924 inclusive, a total of 88,448 galls were found on the 400 trees which were examined, an average of 221 galls per tree. Eighty percent of these galls were from infections resulting from 1920 to 1924 inclusive. Twenty-seven percent of all the galls developed from infections occurring in 1924. Mention should be made of the fact that the majority of the trees on which the galls were counted were naturally reproduced, having seeded from the original introduced trees, which were planted in various years from 1870 to 1883, inclusive. The above data illustrate quite strikingly the way in which White Pine Blister Rust and the majority of introduced plant pests have reacted in their new environment here in America. The Woodgate rust is apparently a slower moving disease than the white pine blister rust, yet

in the light of all known facts it is apparently at least as deceiving as the blister rust. Since the Woodgate rust spreads directly from tree to tree, it will be even more difficult and expensive to combat than the blister rust.

The comparatively sudden and tremendous increase in the amount of infection of the Woodgate Rust, together with the fact that it stunts, malforms and eventually kills the trees on which it becomes established, gives this disease a very decided national as well as local significance. In view of these facts, it became highly important to determine how our native hard pines here in the Northeast, the red pine (Pinus resinosa), the pitch pine (Pinus rigida), Jack pine (Pinus banksiana) and others which may be introduced into this section of our country, together with our southern and western hard pines, might react toward the "Woodgate Rust." This calls for an extensive series of inoculation experiments, which must necessarily extend over a period of several years. These experiments were begun in 1927. Since the Woodgate Rust is not known at present to occur in any other State in our country, it became necessary to conduct these experiments in the vicinity of Woodgate, N. Y. To date more than twenty species and varieties of hard pines have been inoculated.

Infection with the Woodgate Rust occurs directly through the epidermis of the young developing stems. The first indication of infection is a tiny orange-yellow spot. Infection spots have been observed on all species and varieties of hard pines, which have been inoculated. Some species like our Red Pine, have proven to be highly resistant to the Woodgate Rust. Although the yellow infection spots develop, the Red pine "throws off" the disease completely, thus preventing the formation of galls and injury to the tree.

The western yellow pine (Pinus ponderosa), Japanese Black Pine (Pinus thunbergii), the Corsican Pine (Pinus nigra variety calabrica), are valuable pines which will grow at least in some sections of New York and other parts of the Northeast, are now known to be susceptible to the Woodgate Rust. This disease will attack some of our southern pines, such as the Scrub Pine (Pinus virginiana), the Loblolly (Pinus taeda) and Slash Pine (Pinus caribaea). It is yet too early to determine whether other species which were inoculated in 1928 will produce galls.

The Woodgate Rust does not seem to have reached the peak of its destruction at Woodgate. Like the white-pine blister rust, its greatest havoc is on young trees. In a study plot of an area of one and one half acres of naturally reproduced Scotch Pine where there are about 1200 trees per acre, ranging from two to ten years of age, eleven percent of the trees were found to be infected with Woodgate Rust in 1926. A recheck of this plot in the late summer of 1927 showed that twenty-two percent of the trees were infected. Since the galls cannot ordinarily be recognized with surety until twelve to fifteen months following infection, the increase in the number of galls in 1927 was due to infections resulting largely in 1926 together with some from the season of 1925.

Just how serious the Woodgate Rust may prove to be in New York and other sections of the Northeast where it may become established remains to be seen. But enough is now known to show that it will at least, if not controlled, become another drain upon some of our most valuable species of hard pines. In view of the fact that the Woodgate Rust has been moving slowly and has as yet caused little serious damage, it might seem that this disease is of no grave concern. But as stated above, it will at least, if not controlled increase the drainage of our forests which is resulting from fungi and insects. The number of these organisms will undoubtedly increase as time progresses and under our present system of silviculture, particularly where large blocks of a single species are being established both naturally and artificially, the depredations of these pests if not controlled will be appalling.

There is also a possibility that the Woodgate Rust when working alone, may cause no serious damage. Especially might this be true, provided there were no other funguous and insect enemies of our hard pines. But we are finding situations where two or more pests, any one of which alone is of little consequence, are living in seeming harmony side by side and the combined results of their work constituting a serious drain upon the forests where they chance to be present. In view of the fact that the Woodgate Rust seems to be rapidly gaining a foothold in some parts of New York and large plantations of Scotch Pine have already been established, from which in time, natural reproduction is sure to result, and the possibility of the introduction and planting of other species of exotic hard pines here in the Northeast which may prove to be favorable hosts to this rust, it does seem that this disease should be prevented as far as is humanly possible from spreading unhampered.

It may be that the Woodgate Rust has not yet found its most congenial environment here in New York. Our inoculation experiments show that infection with the spores of this rust may occur at a relatively high temperature, namely 80 - 85 deg. F. In a warmer climate, such as in our southern Atlantic States, the Woodgate Rust might prove a very destructive pest. As pointed out, we now know that some of our southern pines are susceptible to the Woodgate Rust. In view of the fact that some of our most valuable species of hard pines are native to this part of the United States, the Woodgate Rust should be kept out of this section of our country, which is primarily our chief source of important naval stores. The turpentine industry alone in the south Atlantic states amounts to more than$60,000,000 per year at the point of production.

The Woodgate Rust is a national problem, as well as of local concern in New York. Thus far it has not been possible to determine the source of introduction, nor the native home of this rust. Until these facts are known it becomes all the more imperative that whoever has any connection with the growing of hard pines should be continually on the alert for Woodgate Rust.

There is a native gall rust (Cronartium cerebrum) of hard pines in the eastern United States. Its alternate hosts are species of oaks. The galls of this rust resemble somewhat those of the Woodgate Rust , and persons who are unfamiliar with these rusts may easily confuse them.

The studies on the Woodgate Rust are being conducted by the Conservation Department of New York, in cooperation with the Office of Forest Pathology in the United States Department of Agriculture. These organizations will gladly receive any specimens of gall rusts which may be sent to them for identification.

RESOLUTIONS ADOPTED BY THE 14th ANNUAL BLISTER RUST CONTROL CONFERENCE

Resolved that the Blister Rust Control Agents extend to Dr. Taylor their sincere appreciation for his favorable action in permitting them to attend the 1928 Annual Blister Rust Control Conference.

Resolved that the 14th Annual Blister Rust Control Conference hereby expresses its appreciation to the Quidnessett Grange for the splendid lunch it provided at Goddard Park, and congratulates the Grange upon its initiative and interest in raising funds for its new building.

Resolved that the Secretary express to Dr. Haven Metcalf our regret that he was unable to attend this conference and our hope that he will be able to be with us next year.

Resolved that this Conference thank Commissioner Lewis for his hearty welcome and helpful cooperation, and assure him of our desire to support him in his efforts to advance the interests of forestry in Rhode Island.

Resolved that this Conference express to the Metropolitan Park Commission our appreciation of its courtesy in providing facilities for our meeting at Goddard Park, and urgently recommend that the Commission maintain the forest plantings in the Park as demonstration plantations to encourage general and effective forest planting in Rhode Island.

Resolved that this Conference congratulate Mr. T. G. Mathewson on his successful reforestation work in Goddard Park, and extend to both Mr. and Mrs. Mathewson our sincere appreciation of their cooperation in arranging for and participating in our meeting at Goddard Park.

Resolved that this Conference wishes to express its gratitude to Mr. A. B. Graham for his most interesting and helpful talk on the psychology of securing cooperation, and that the Secretary is hereby instructed to transmit a copy of this resolution to Mr. Graham.

Whereas this 14th Annual Blister Rust Control Conference is the first which Mr. S. B. Detwiler has failed to attend:
Be it Resolved that the Conference express to Mr. Detwiler through its Secretary our regret that he cannot be with us; our sympathy in his prolonged illness; and our best wishes for an early return to normal health;
Be it further Resolved that we express to Mr. Detwiler the sincere appreciation of his co-workers for the faithful and inspiring leadership he has given us, and pledge to him our continued support in this work.

W. O. Filley,

Chairman, Resolutions Committee.

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